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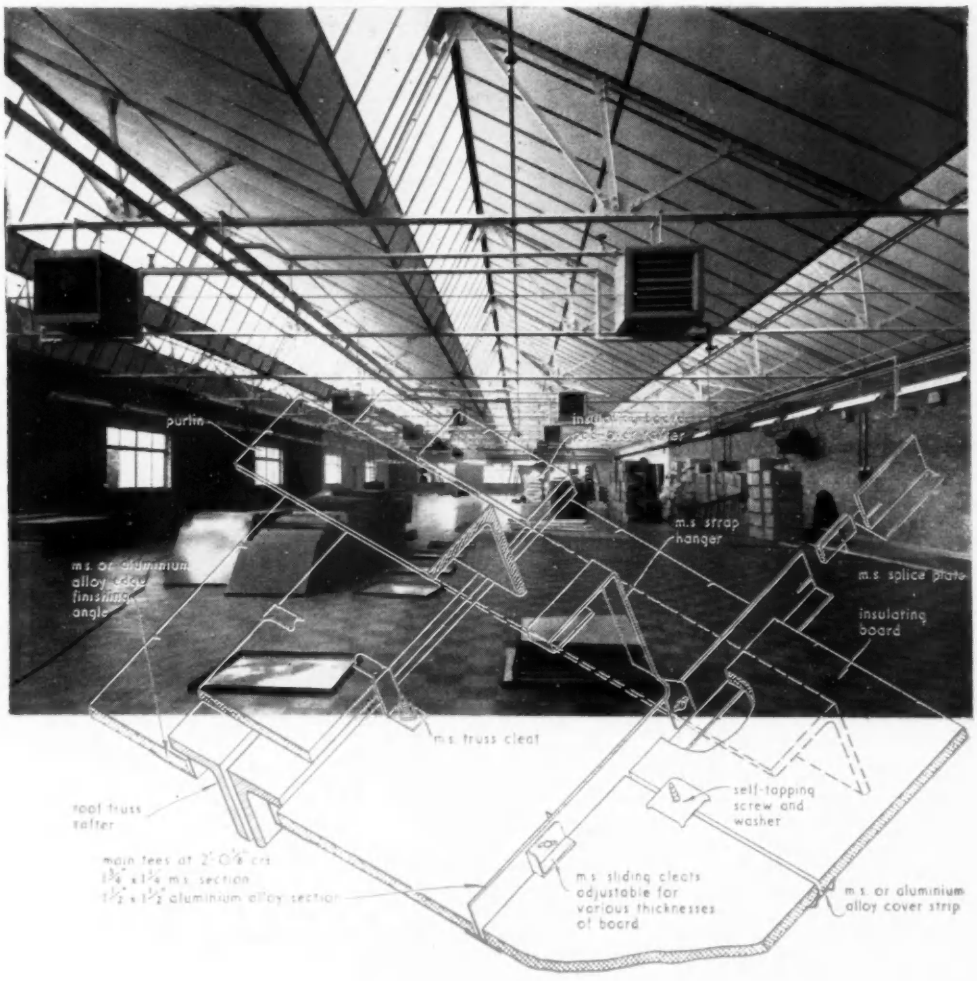
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1. Economics of the Industry.
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3. Filament Spinning and Stapling.
4. Opening and Blending on the Cotton System.
5. Description and Function of the Revolving Flat, and the Roller and Clearer Card.
6. Drafting on Roller Frames.
7. Cotton-type Spinning-frames.
8. Sliver Forming on Flax- and Jute-type Cards.
9. Flax- and Jute-type Systems of Preparation.
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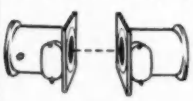

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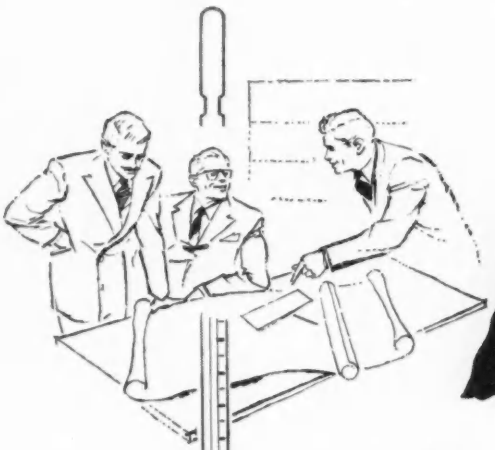

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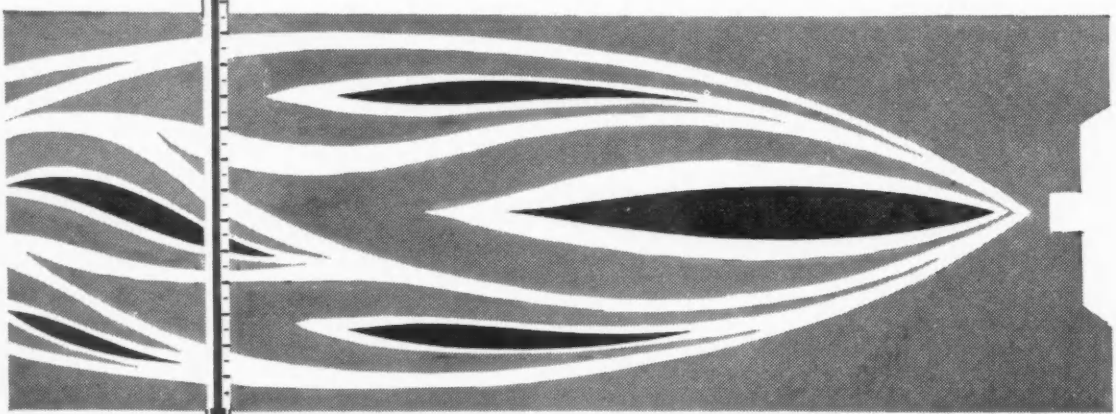

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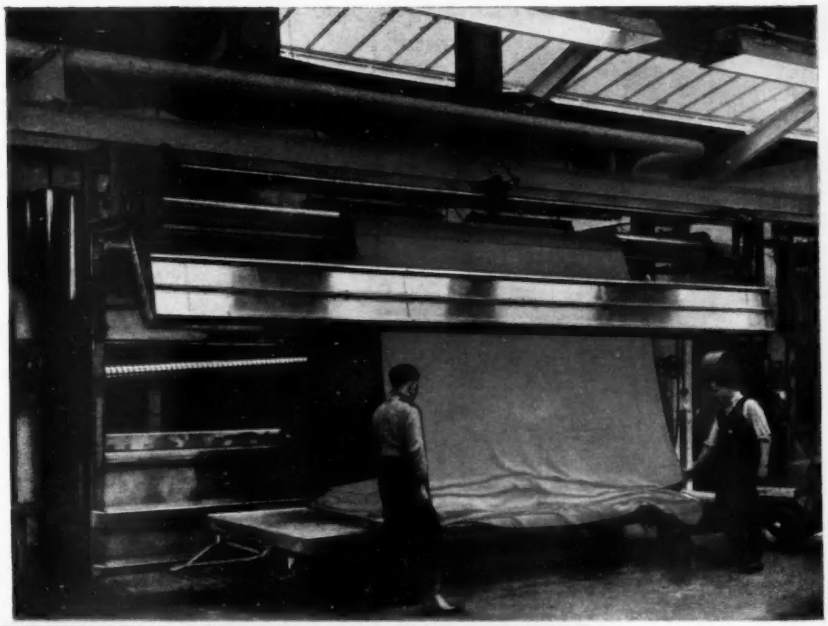

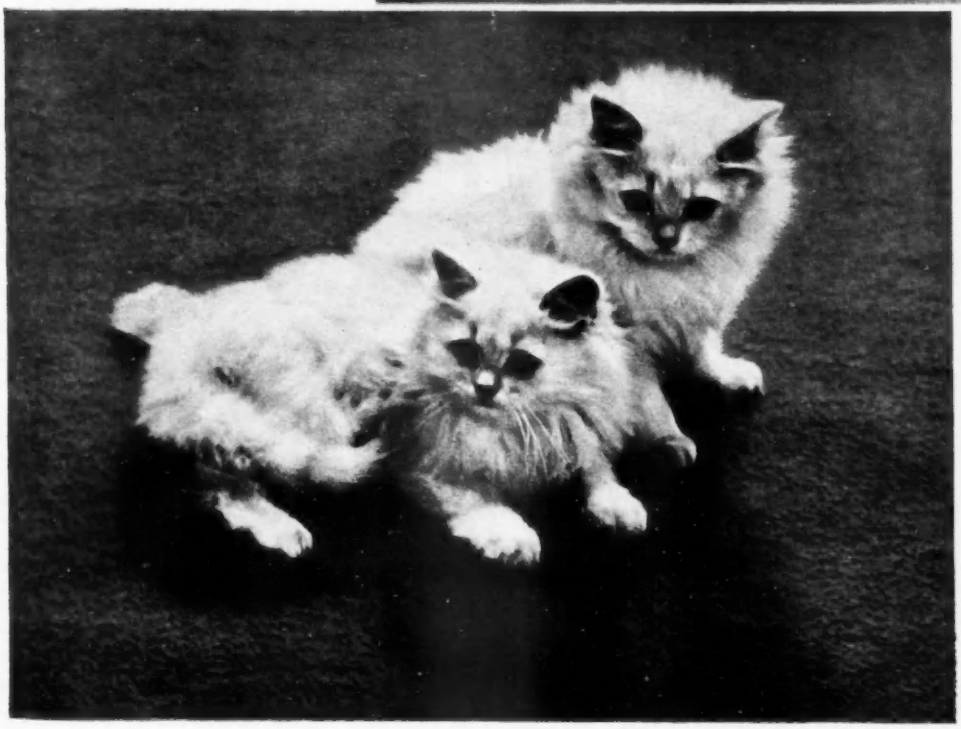

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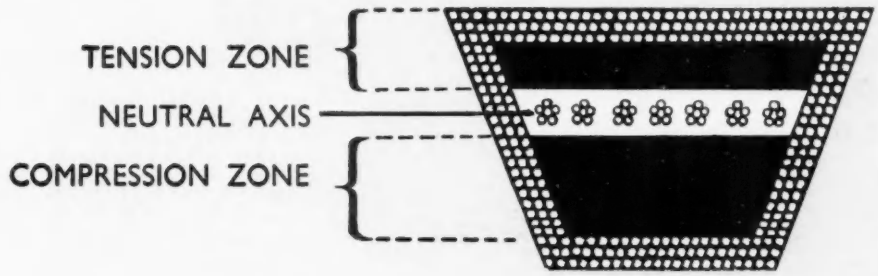

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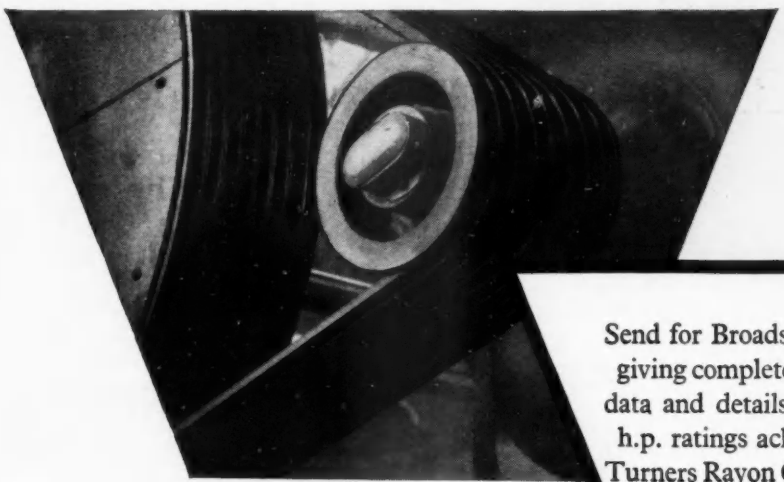

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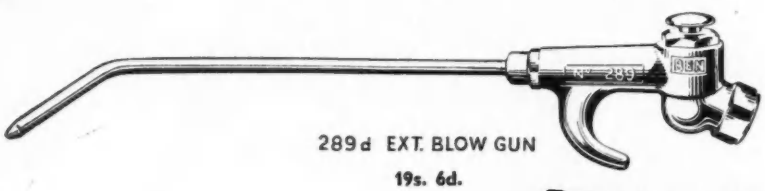

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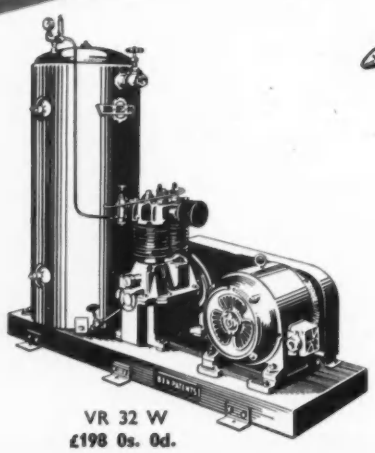

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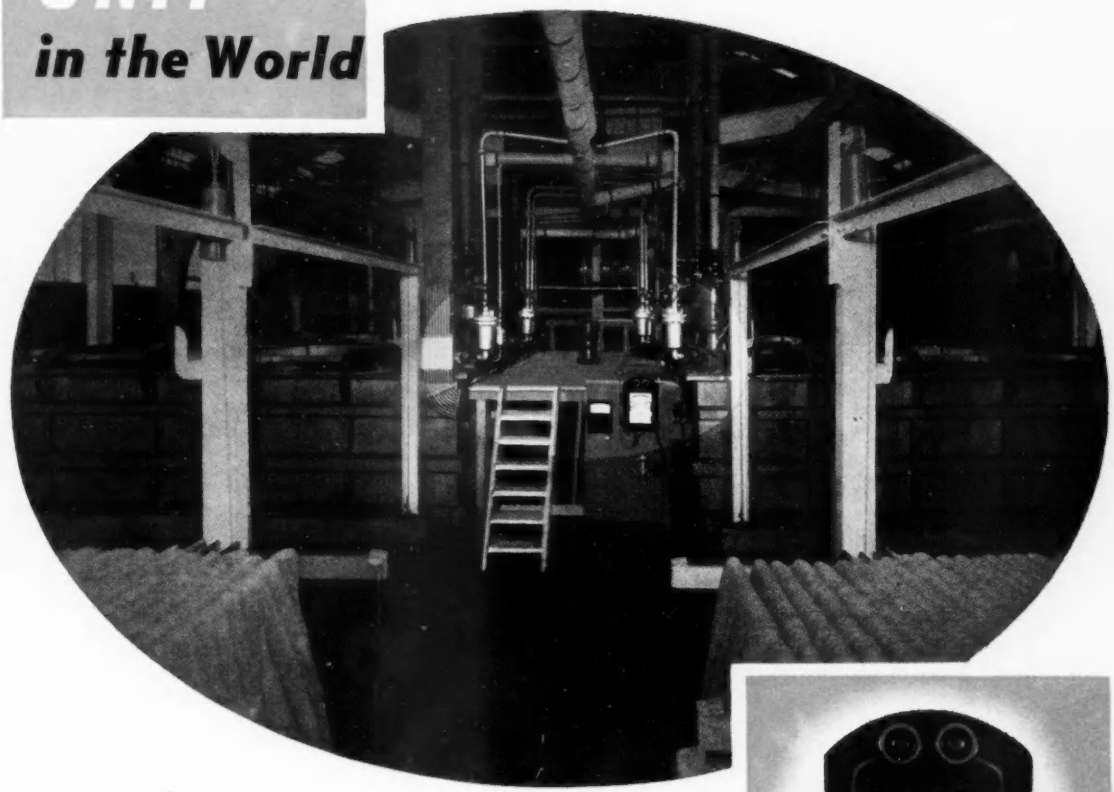

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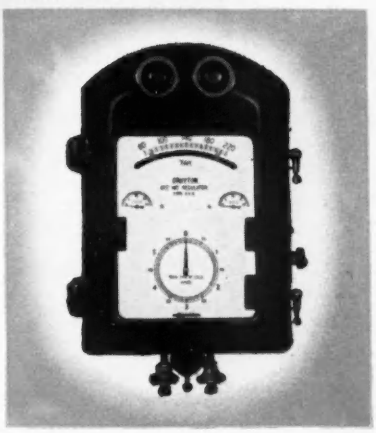

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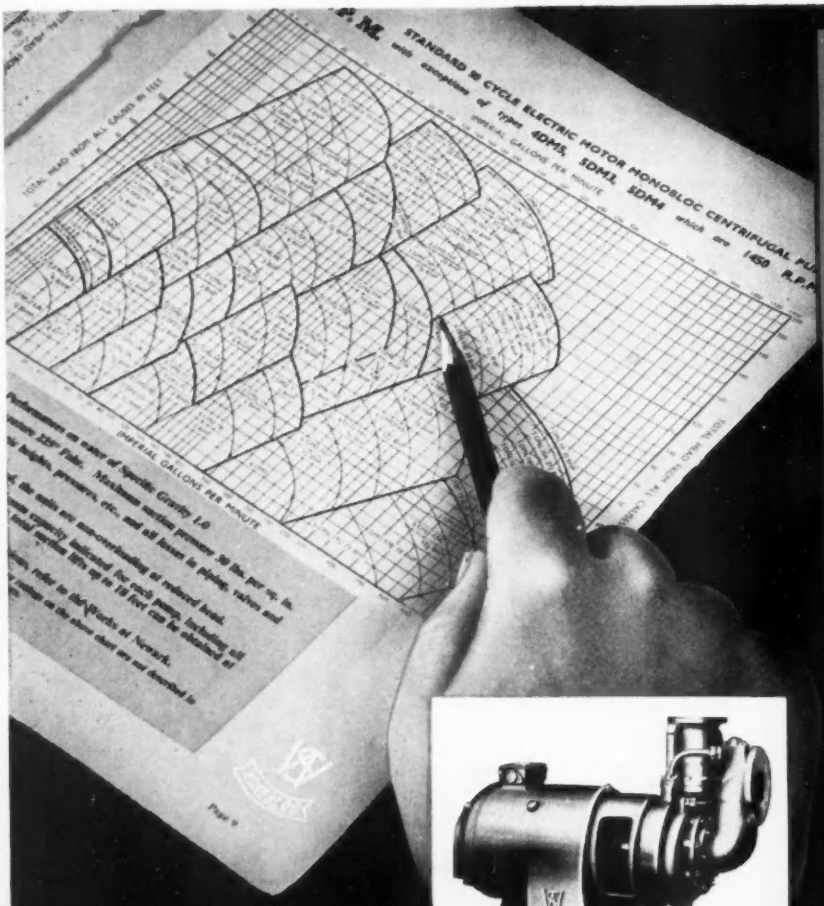

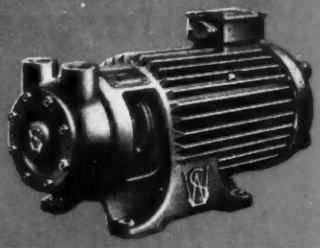

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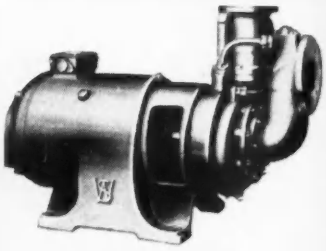

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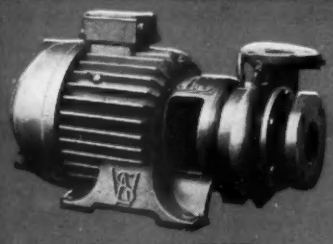

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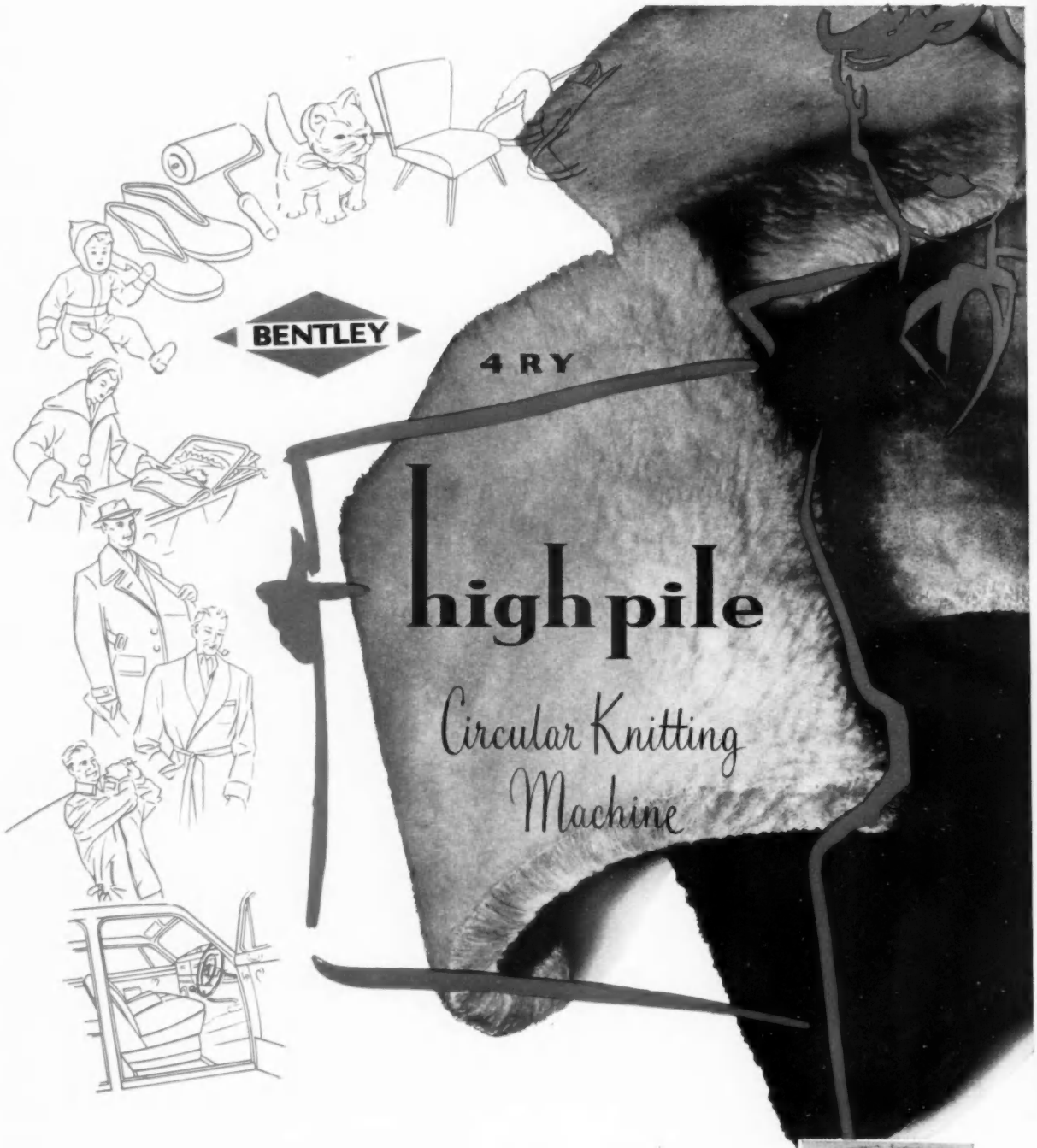

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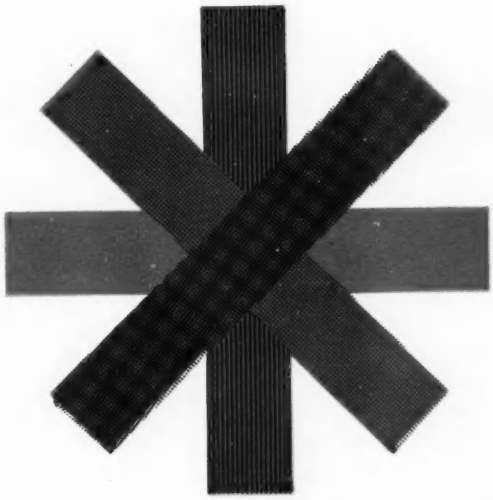

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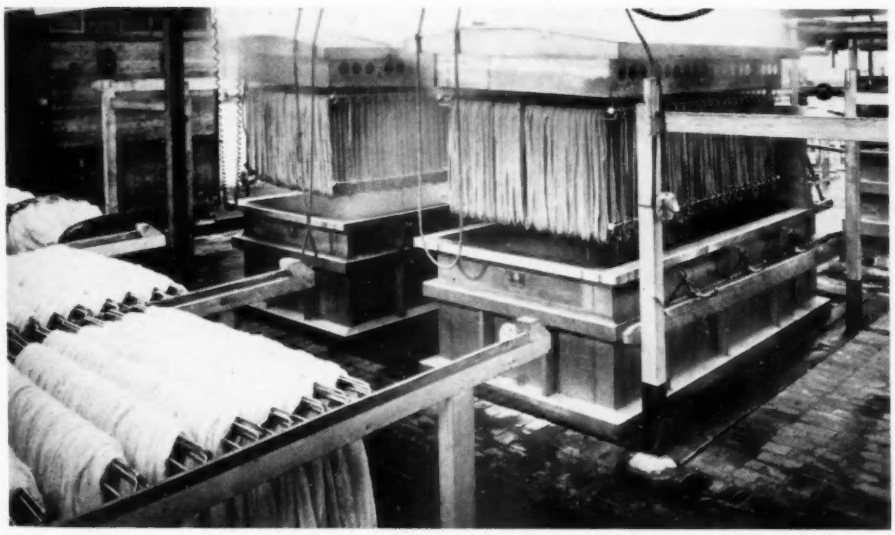

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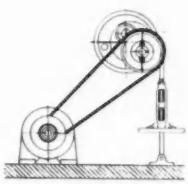

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PRESSURE DYEING MACHINES

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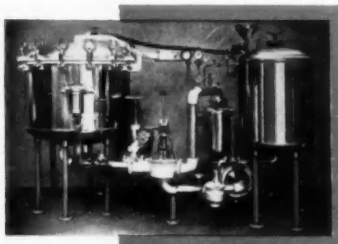


HANK DYEING MACHINES

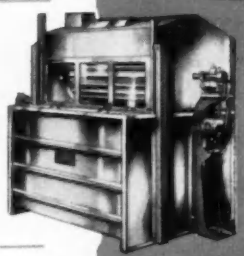
Built in stainless steel in capacities ranging from 25 to 1500 lbs. for all classes of wool, worsted, mixture and linen yarns in hank form. Machines may be coupled together.

LOOSE STOCK DYEING MACHINES

For all classes of loose stock, rags and synthetic fibres, in 3 capacities of 10–50 lbs., 100–250 lbs. and 200–600 lbs. Stainless steel construction.

PIECE GOODS DYEING MACHINES

A comprehensive range of machines available in stainless steel for dyeing all types of woollen or worsted piece goods, silk or rayon fabrics and knitted fabrics in rope form. Also carpet dyeing machines.

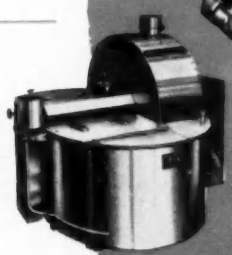


ROTARY DYEING MACHINES

Totally enclosed rotating drum machine for dyeing nylon, pure silk, rayon and cotton hose with perfect penetration and uniformity. Stainless steel in 25, 50, 100, and 200 lbs. capacities.

PADDLE DYEING MACHINES

A versatile machine, in stainless steel, for ladies' hose, half hose, and loose articles. Also used for anti-shrink and bleaching. 4 capacities from 12–200 lbs.



DYEING AND FINISHING MACHINES

Builders of dyeing machines for loose stock, hanks, packages, piece-goods, fabric and hose; also finishing machines for all classes of circular knitted and warp loom fabrics and garments. Pre-boarding and finishing machines for nylon hose.

A Member of the Bentley Group

SAMUEL PEGG & SON LTD · **Barkby Rd** · **Leicester** · **England** Telephone: 66651 · Telegrams: 'PULSATOR'

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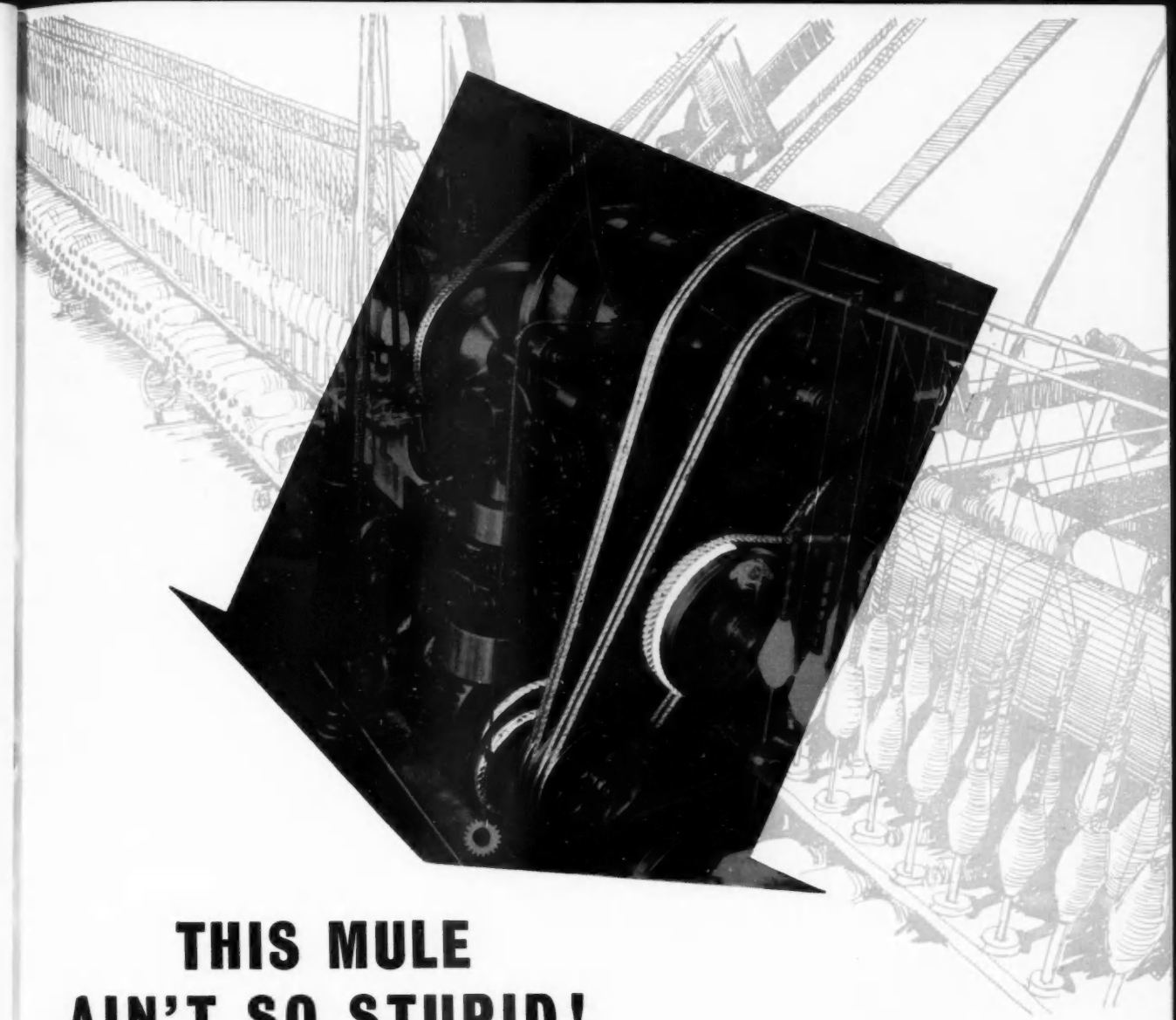

THIS MULE AIN'T SO STUPID!

The operators of this particular mule get quite a kick out of its increased efficiency since Ledray's Kirkstall Brand Textile Ropes were installed. The down band is a Cotton rope, both rim and draw bands are made of Nylon, while the scroll bands are of blended Nylon and Cotton. Kirkstall Brand Textile Ropes and Bandings are now available in Cotton, Nylon and Terylene, or Cotton blended with Nylon or Terylene. Please write for our technical advice if in doubt as to the best type of rope for your requirements.

KIRKSTALL BRAND ROPES BY LEDRAY

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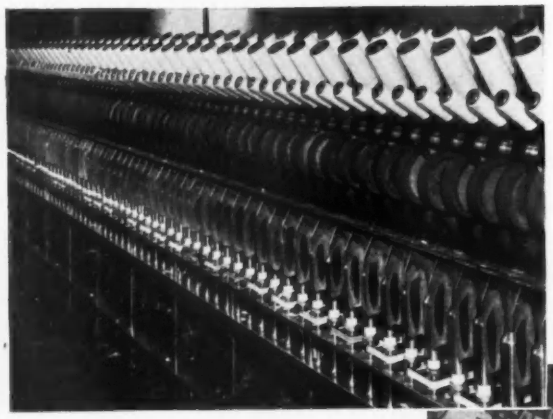
In Yorkshire they spin better*

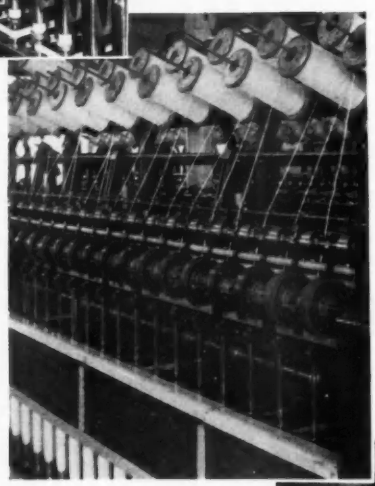
with

TICO

Synthetic Roller Coverings

TICO Coverings are suitable for English and Continental Spinning and Drawing in the Woollen Worsted and Allied Synthetic Fibre Industry.



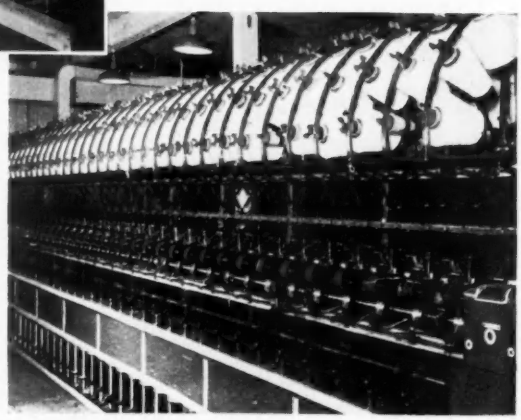


Further points of note :

- Cooler running.
- Perfect control on drafting.
- Ground to precision limits.
- Fewer end-breakages and more uniform sliver produced.

Some of their outstanding advantages :

- Clean running at all times.
- Unaffected by oils or creams.
- Reduced "fly."
- Less-than-normal tension needed.
- Pressing weight loading reductions of 50% are possible.



All types of roller coverings and accessories to the industry.

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Phone : Low Moor 365.

We gladly offer expert technical advice on the practical application of TICO products. To enable us to do this, continual research is undertaken to keep abreast of technical developments in the textile trade.

** These photographs are exhibited by courtesy of Ormerod Brothers Limited, Brighouse, with whom yarn quality is a primary consideration.*

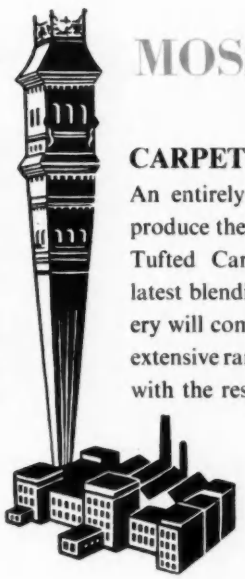
INDIA MILLS

(DARWEN) LTD

INDIA MILLS

FASHION YARNS

The productions of these mills are styled to cater for the specialised requirements of the suiting and dress fabrics trades. Colour appeal, durability and price factors are all considered in the well recognised qualities offered by this company. The incorporation of the latest developments in new synthetic fibres, combined with experienced use of Spun Dyed Colours adds to the reputation of "India Yarns".



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CARPET YARN DIVISION

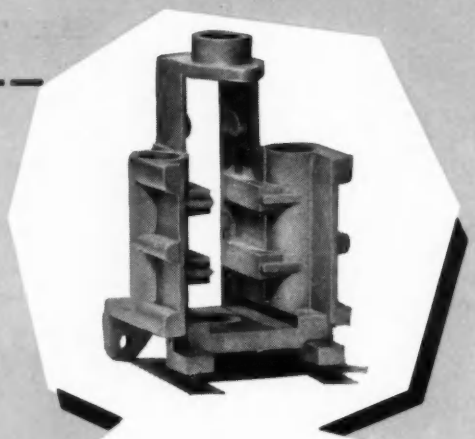
An entirely new plant, designed to produce the best in yarns for the new Tufted Carpet Industry. The very latest blending and spinning machinery will combine the attraction of an extensive range of Spun Dyed Colours with the resistance to wear provided by Nylon reinforcement.

INDIA MILLS (DARWEN) LTD. DARWEN, LANCASHIRE

Quality castings in quantity

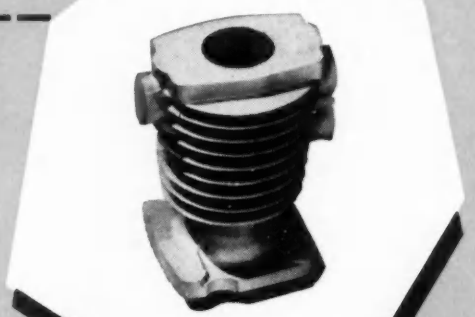
PRESSURE DIE CASTINGS

A large battery of Pressure Die Casting machines can supply quality castings for continuous supply in large quantities—on time. A wide range of alloys are available. This frame is supplied in Zinc-based Alloy BS.1004A.



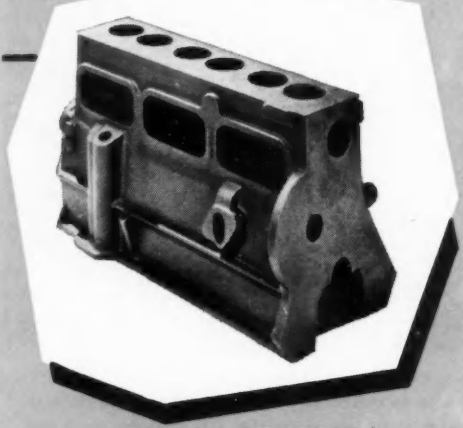
GRAVITY DIE CASTINGS

We have available a large Aluminium Gravity Die Casting Foundry where high quality precision castings are produced in a wide range of alloys. The cylinder shown is gravity die cast in LM.4 alloy.



MECHANISED & FLOOR CASTINGS

The Iron Foundries consist of five mechanised moulding units for castings up to 500 lbs. weight, maximum size 4 ft. x 3 ft. and a floor casting section handling up to 5 tons weight. Careful tests are made at all stages and castings can be balanced and locations machined to reduce machine shop time.
The Aluminium Foundries also include a large mechanised and a jobbing section.



We shall be pleased to help on your next casting problem.

West Yorkshire Foundries Ltd.

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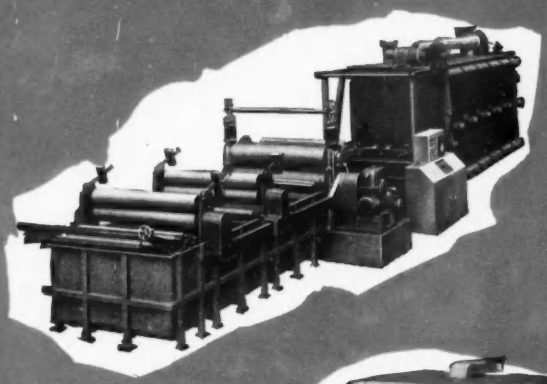
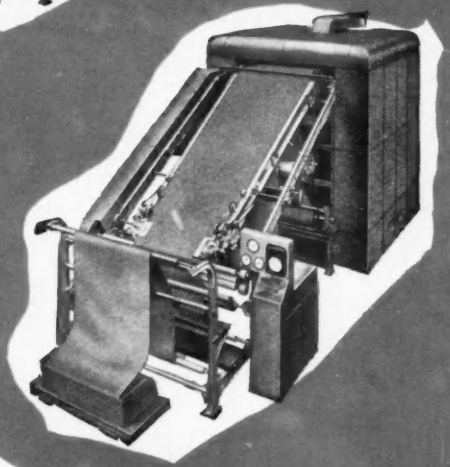
Telephone LEEDS 29466

London Office: HANOVER HOUSE, HANOVER SQ., W.1
Telephone MAYfair 8561

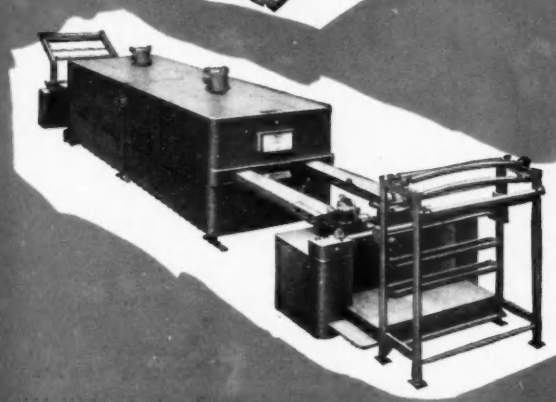
Talented Threesome
from Beech Works



From the range of textile finishing machinery manufactured at Beech Works we bring this talented trio into the limelight. The **E.G.W. Carboniser** (top illustration) incorporates the latest Open Width Acidizer with automatic acid strength control, and 3-stage Drying and Baking Unit. A completely synchronised plant, with comprehensive control panel for one-man operation.



The now well known **Mark III E.G.W. Velocitair Tentering Machine** (centre) is a multi-layer machine employing nozzle drying, which occupies extremely small floor space, and is suitable for all types of fabrics, from lightweight materials to heavy overcoatings, and even Mohair rugs.



The bottom illustration shows one of the more recent additions to the E.G.W. Range— the famous **E.G.W.-Vits Universal Stenter,** now manufactured under licence at Beech Works. This phenomenal machine incorporates the Vits World Record Drying System for the quick drying, shrinking or setting of fabrics, or for polymerising and processing of resin finishes.

FOR FURTHER DETAILS OF THESE MACHINES PLEASE WRITE TO OUR SALES DEPT.

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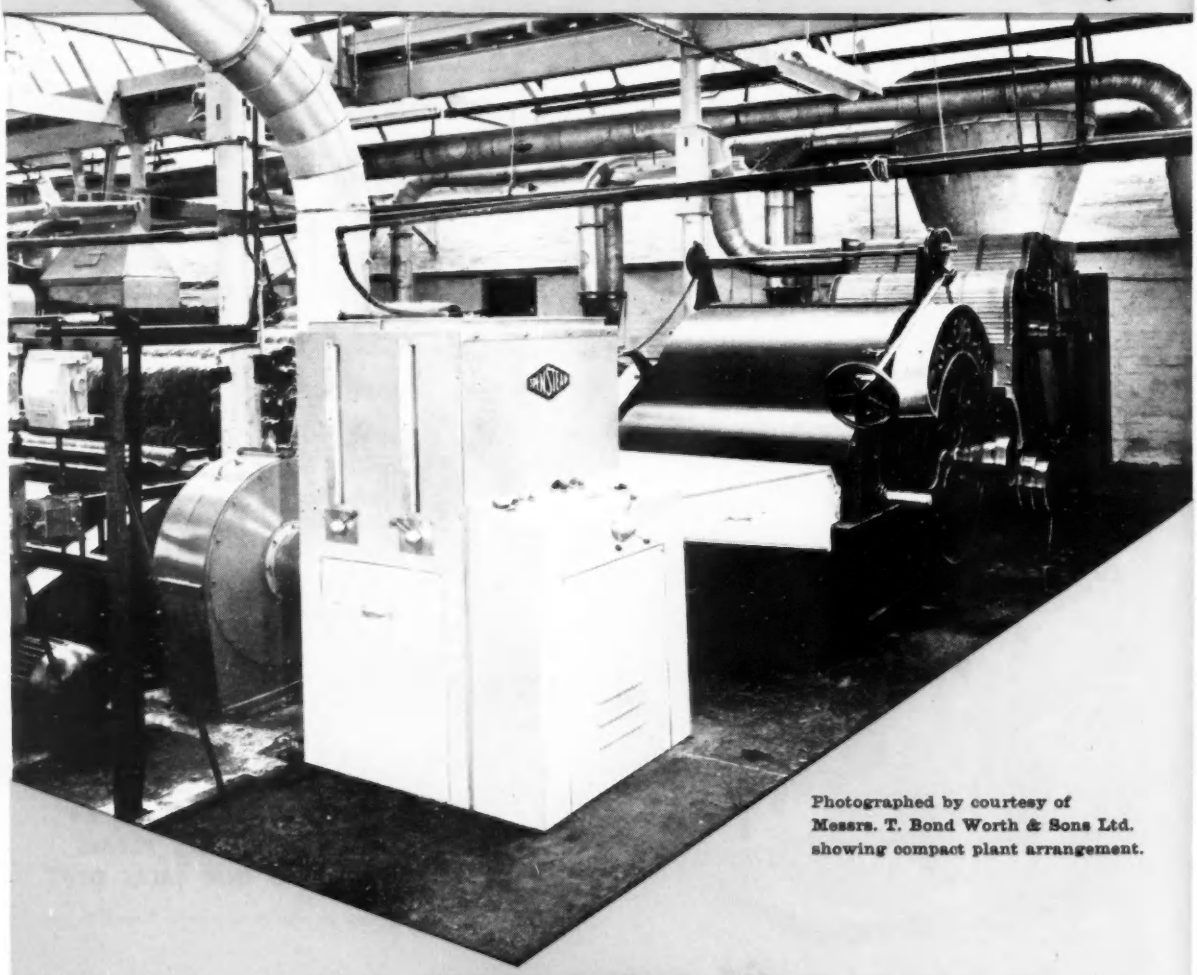
With this new Vortex Wool Oiler you just set the quantity control, "switch on" and the rest is automatic. Wool flow and oil flow are synchronised—No pumps—No compressed air—no jets to make up—no trouble. Only the new Vortex has all you ever hoped for.



Photographed by courtesy of Messrs. T. Bond Worth & Sons Ltd. showing compact plant arrangement.

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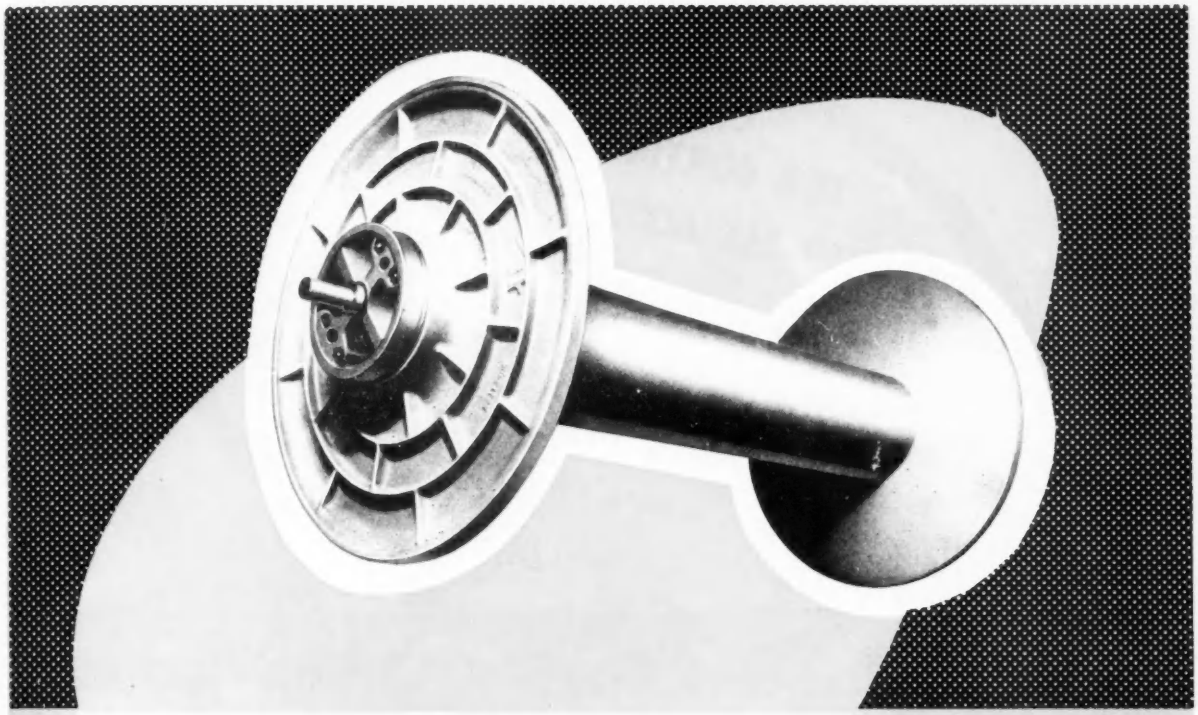

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Dynamically balanced for smooth efficient running

Produced in 'Elektron' Magnesium Alloy which is 40% lighter than Aluminium, with equal strength properties. Other products include dynamically balanced Backing Drums, Adjustable Flanged Beams, Section Warp Beams, Loose Flanges, Jacquard Cylinders and larger type Bobbins, made to our exclusive design or customer's specific requirements. The services of our Textile Technical Department are at your disposal for information and advice in connection with the above, or any new projects.

STERLING METALS LTD.

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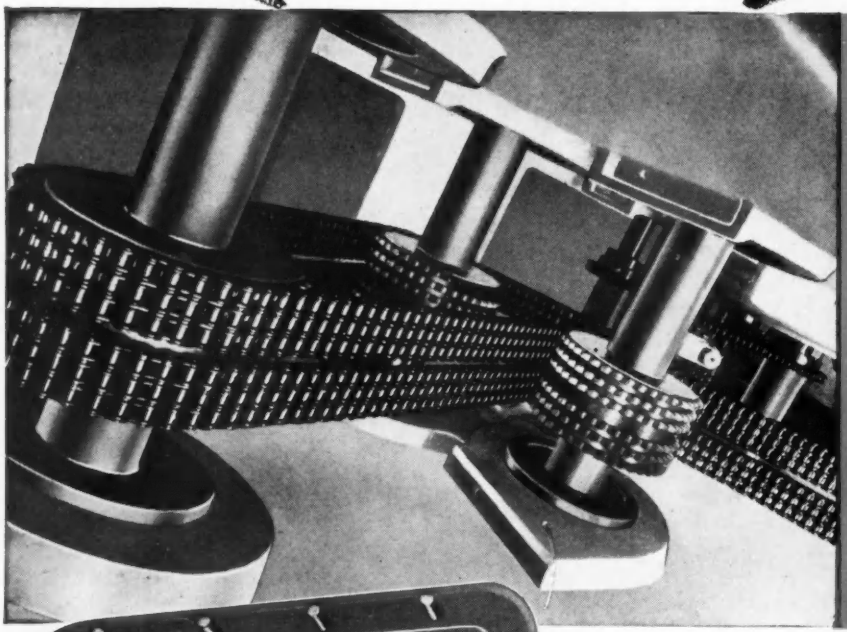
UNDER ALL CONDITIONS *Specify*

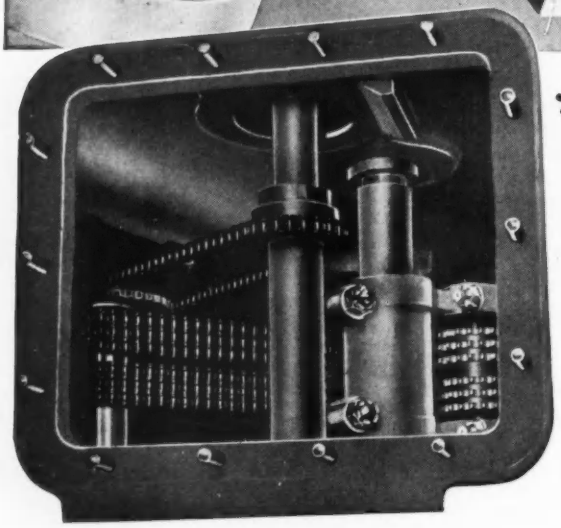
PERRY

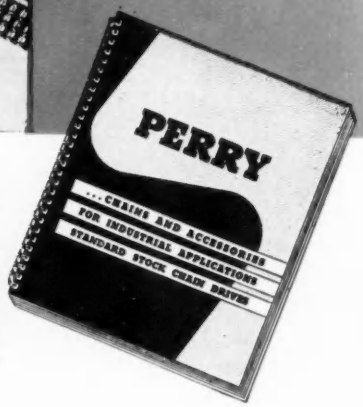
MULTI-STRAND CHAIN DRIVES

—BRITISH NYLON SPINNERS DO!



These photographs illustrate Perry multi-strand chain drives as used extensively by British Nylon Spinners Limited. For long and *consistently* reliable service it pays to specify Perry. Let our technicians help to solve *your* chain drive problem. Your enquiry will be given immediate and expert attention.





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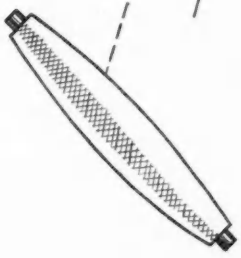

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35 CEM mills will answer your call

If the yarn you require can be spun on the cotton system, at least one of the 35 mills of Combined English Mills (Spinners) Limited can offer it to you. Whether it be a yarn of cotton, viscose rayon, acetate, nylon, polyester or acrylic fibre, somewhere in the Group it will be spun in the appropriate count.

BRANCHES OF THE GROUP

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COWLING Spinning Co., Chorley *Chorley* 2251
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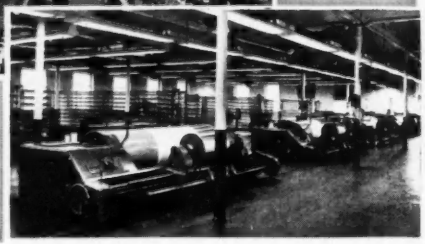

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Visit our Stand No. 2704 at the Textile Recorder International Textile Machinery and Accessories Exhibition, Belle Vue, Manchester, October 15th - 25th, 1958

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FOR WEAVING. Nylon and "Terylene" on Cheese, Pirn or Beam. Silk Organzine and Tram.

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Makers of

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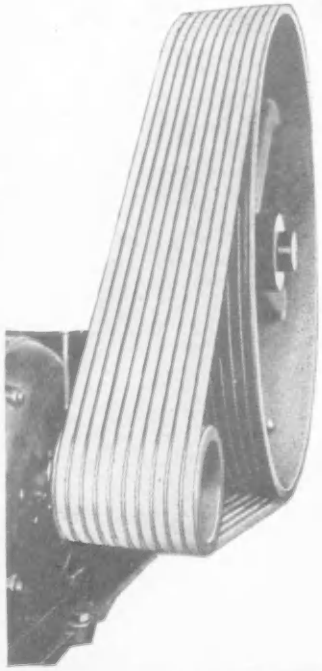

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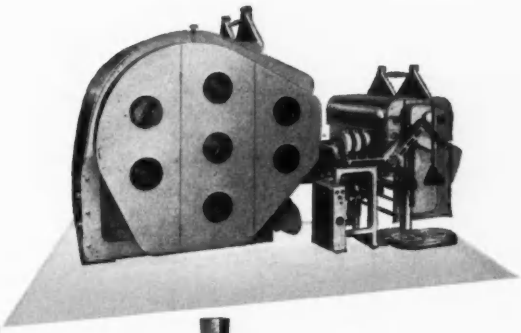

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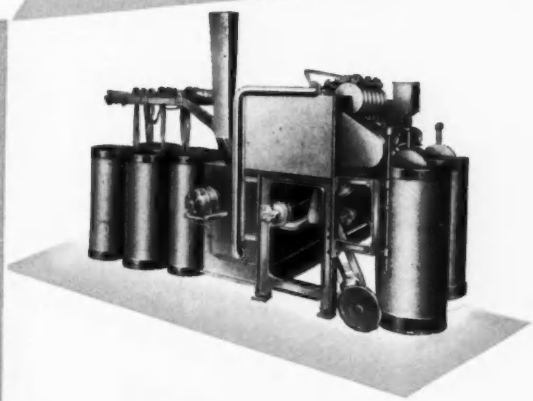
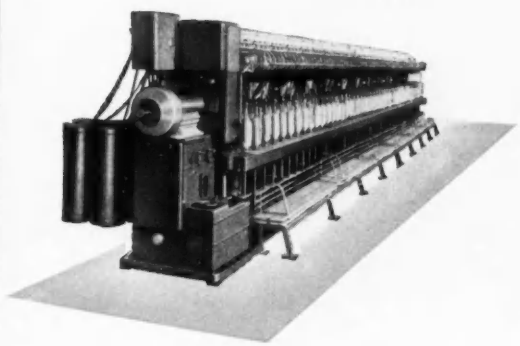
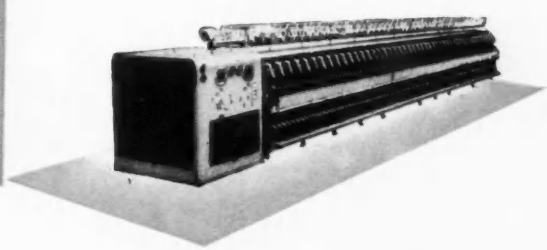
FLAX AND HEMP SPINNING MACHINES

- Flax and Hemp Tow Breaker Carding Machine — a most up-to-date type
- High-speed Flax and Hemp Tow Draw Frame
- Flax and Hemp Tow Roving Frame
- Our Speciality: Ring Wet Spinning Frame

We shall be pleased to demonstrate these new machines in our up-to-date factories







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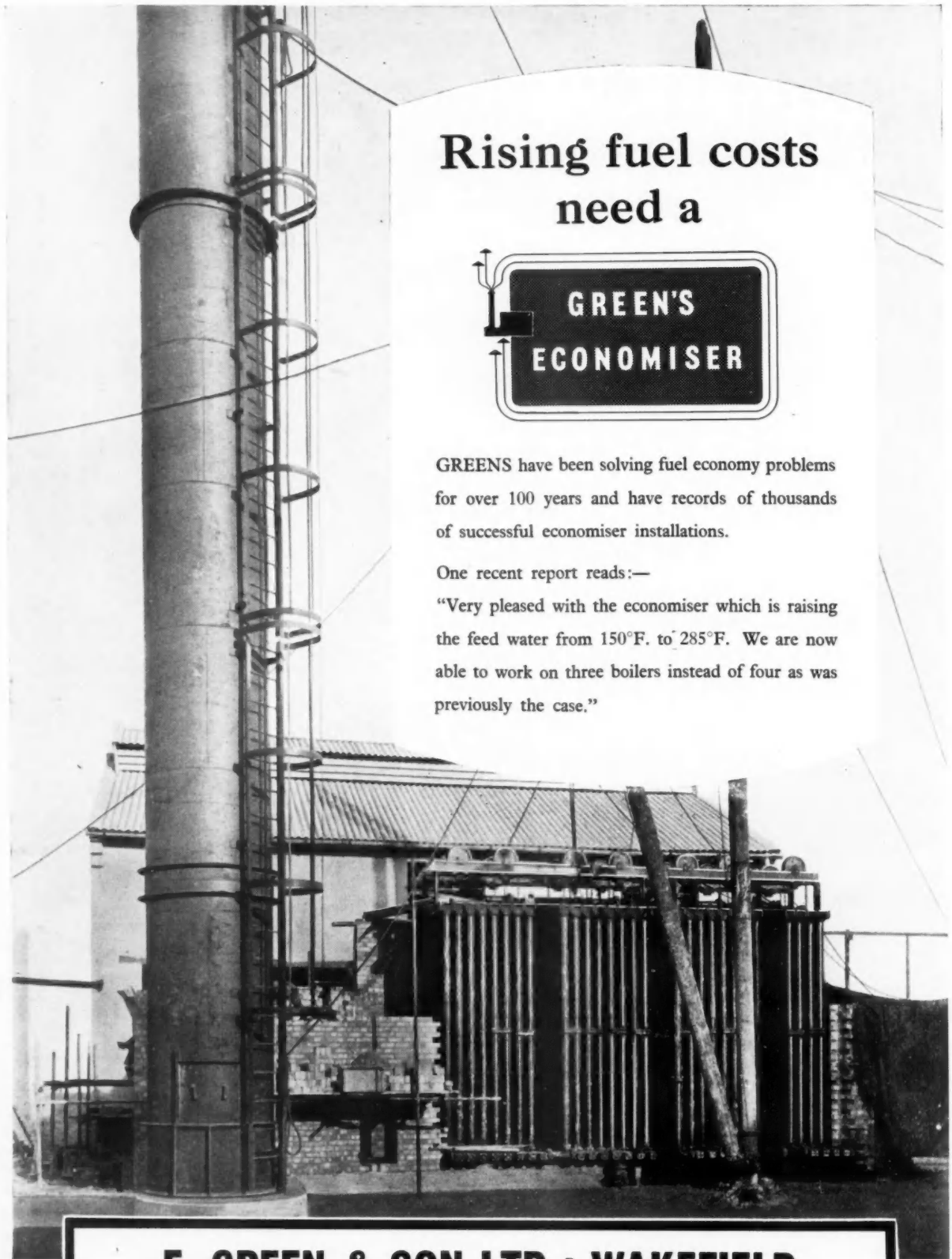

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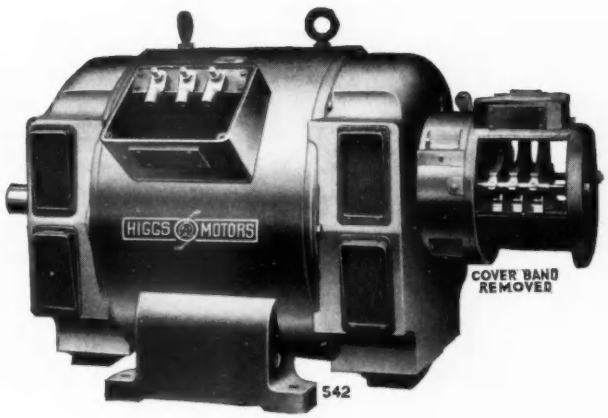

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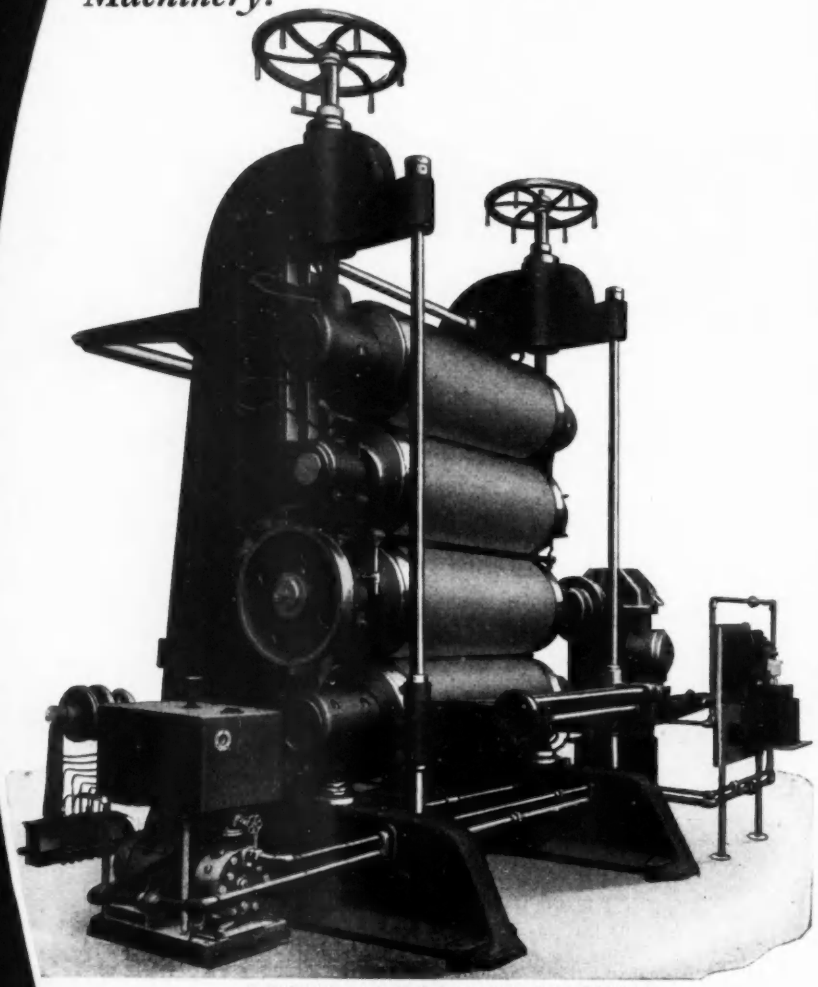

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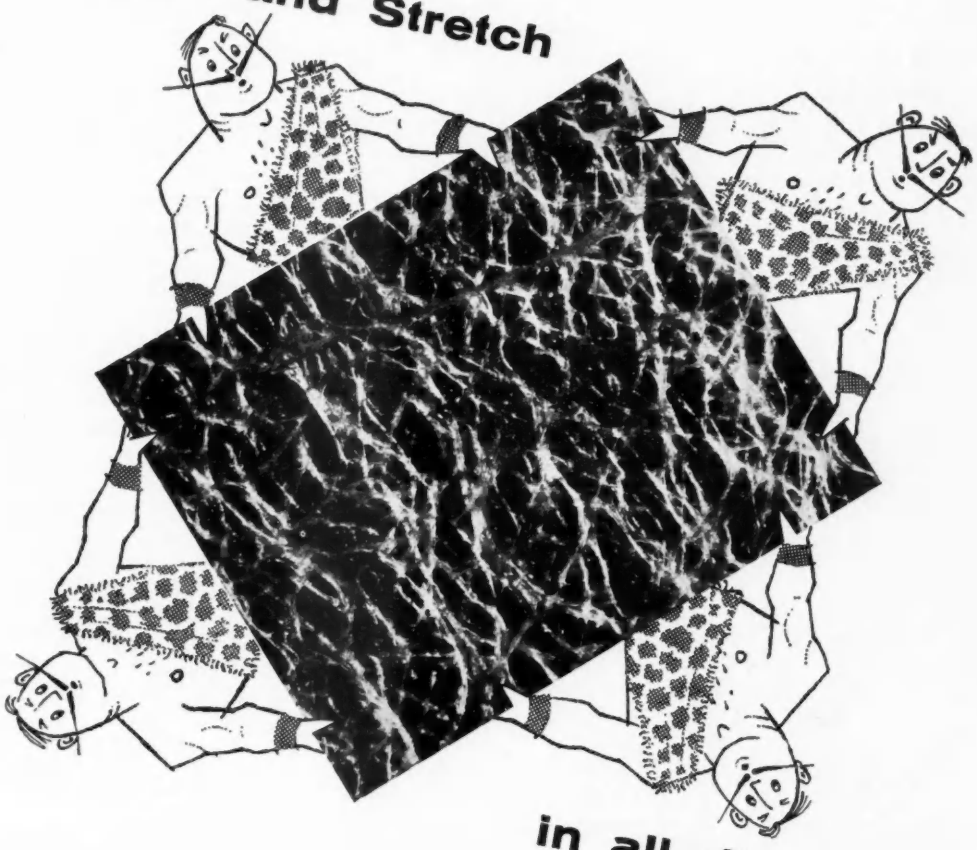

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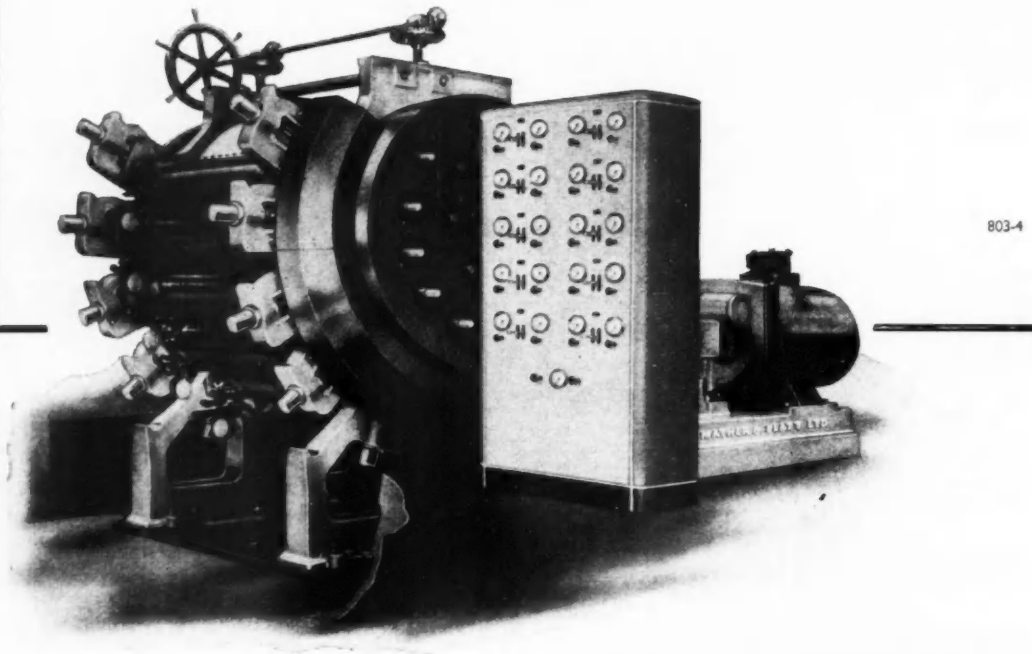

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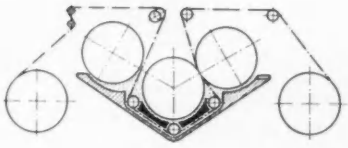
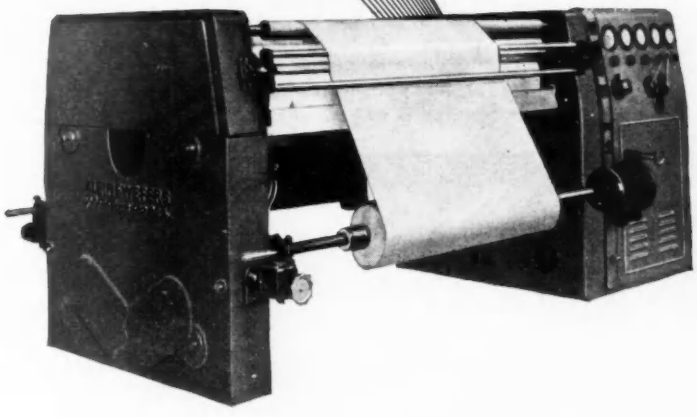


Passage of cloth in the *Padmaster*.



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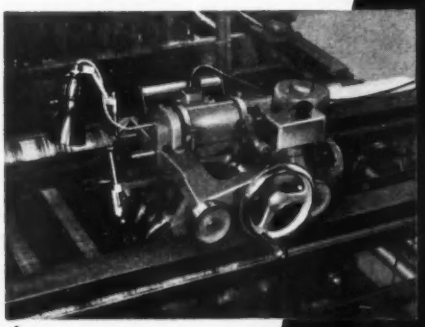
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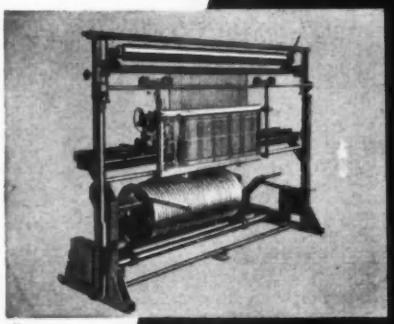
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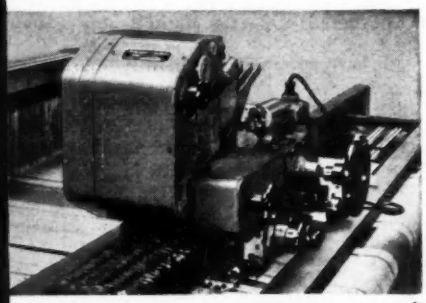
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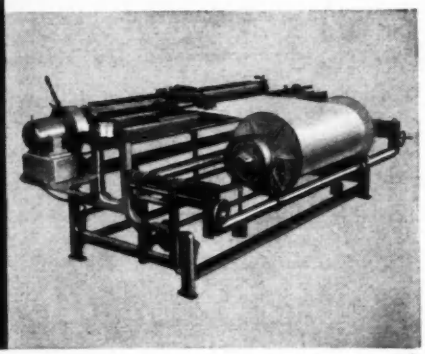
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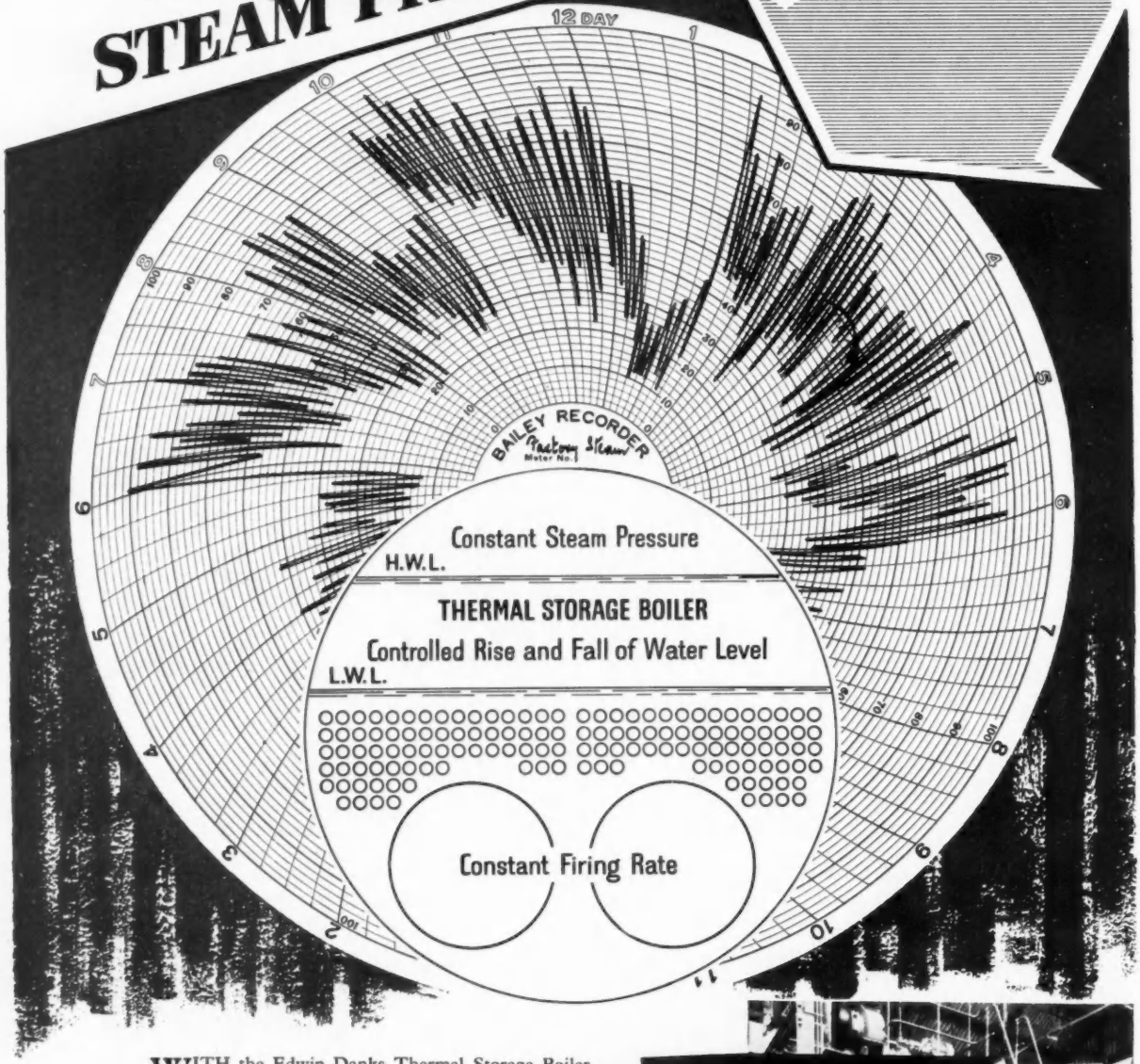

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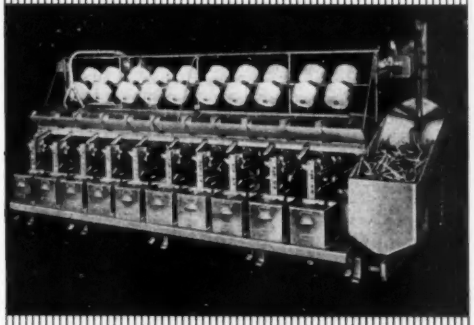

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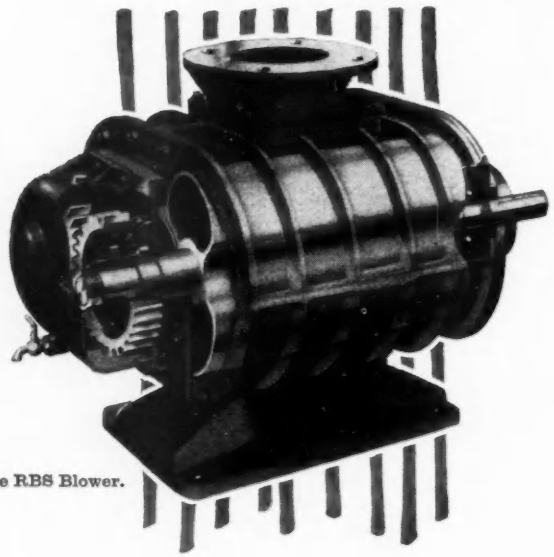

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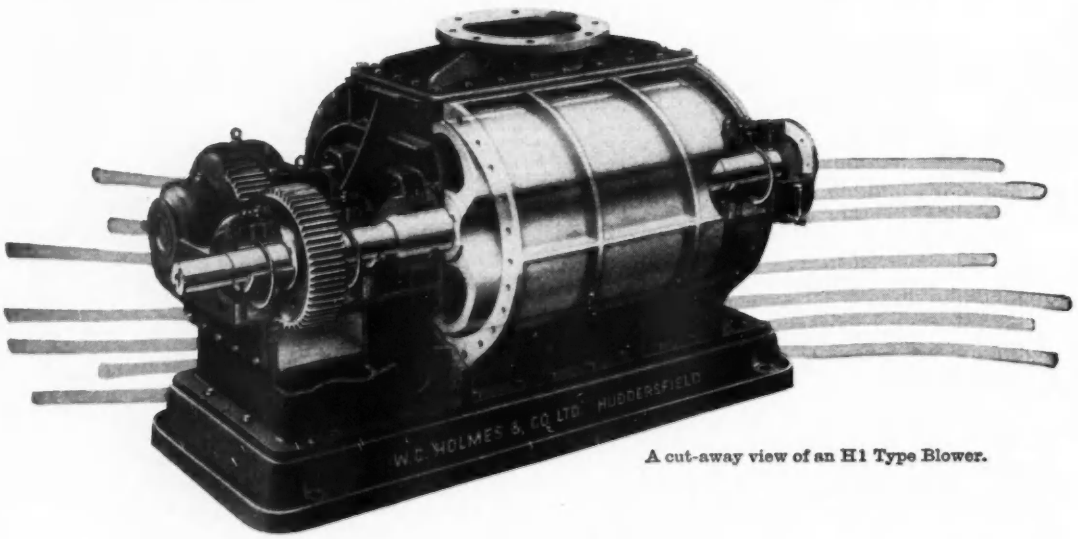

A cut-away view of an H1 Type Blower.

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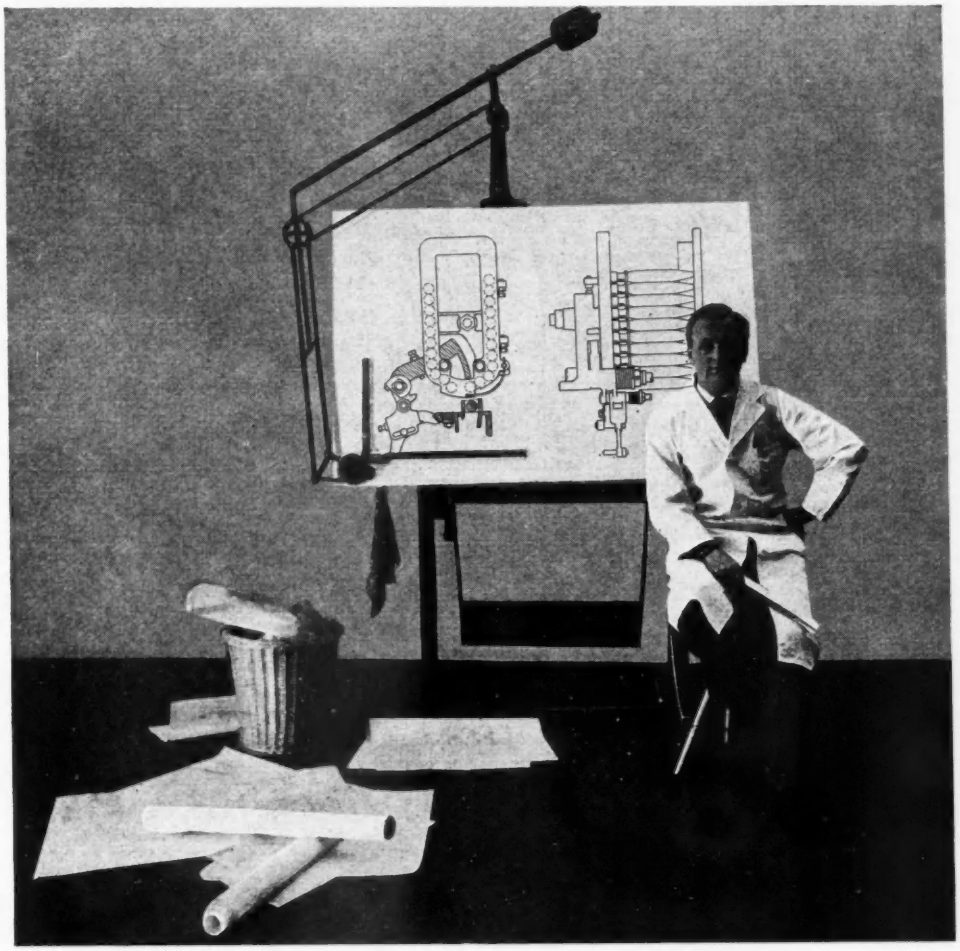

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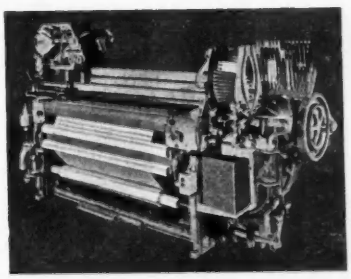

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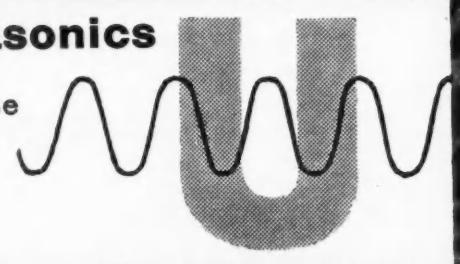

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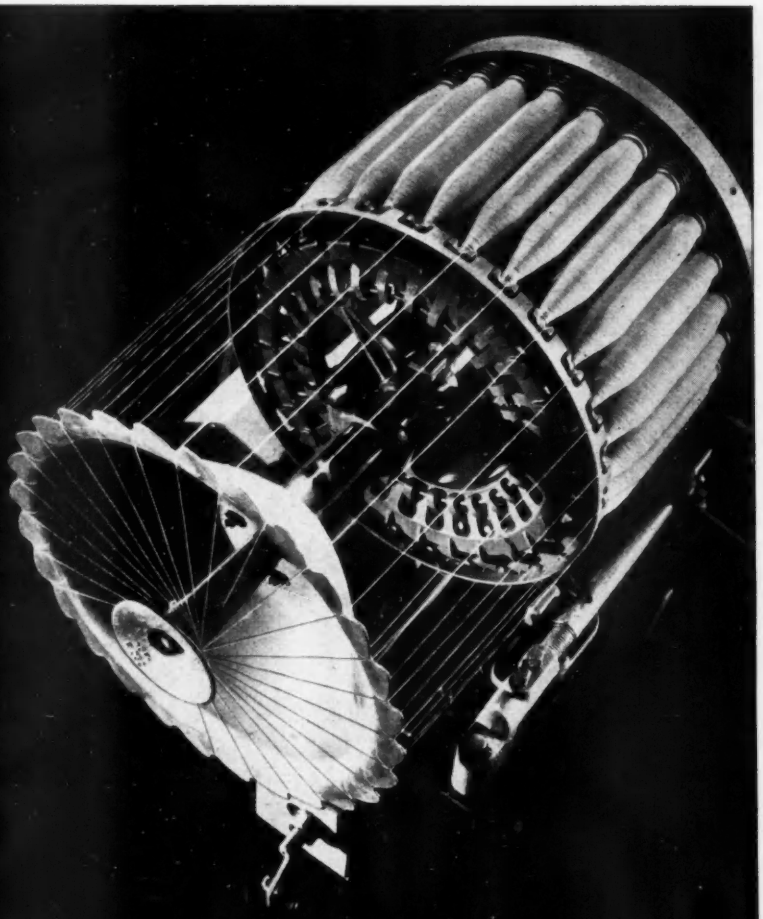

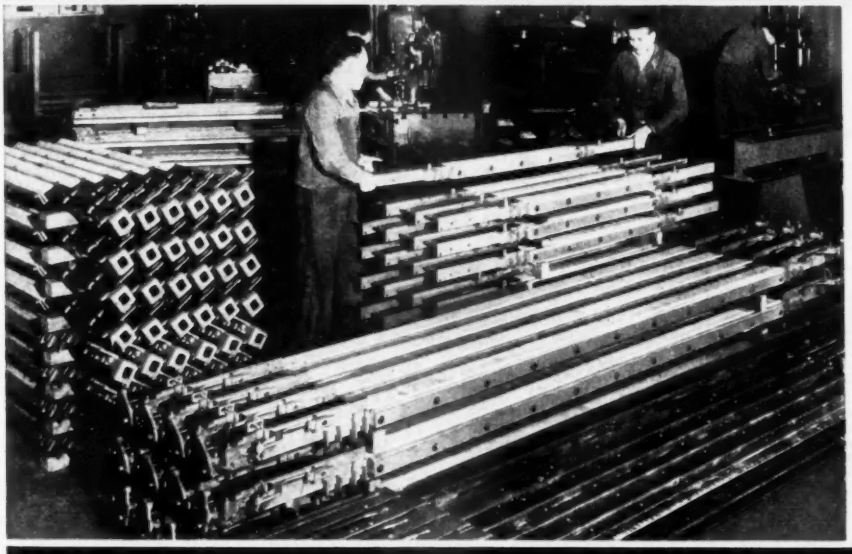

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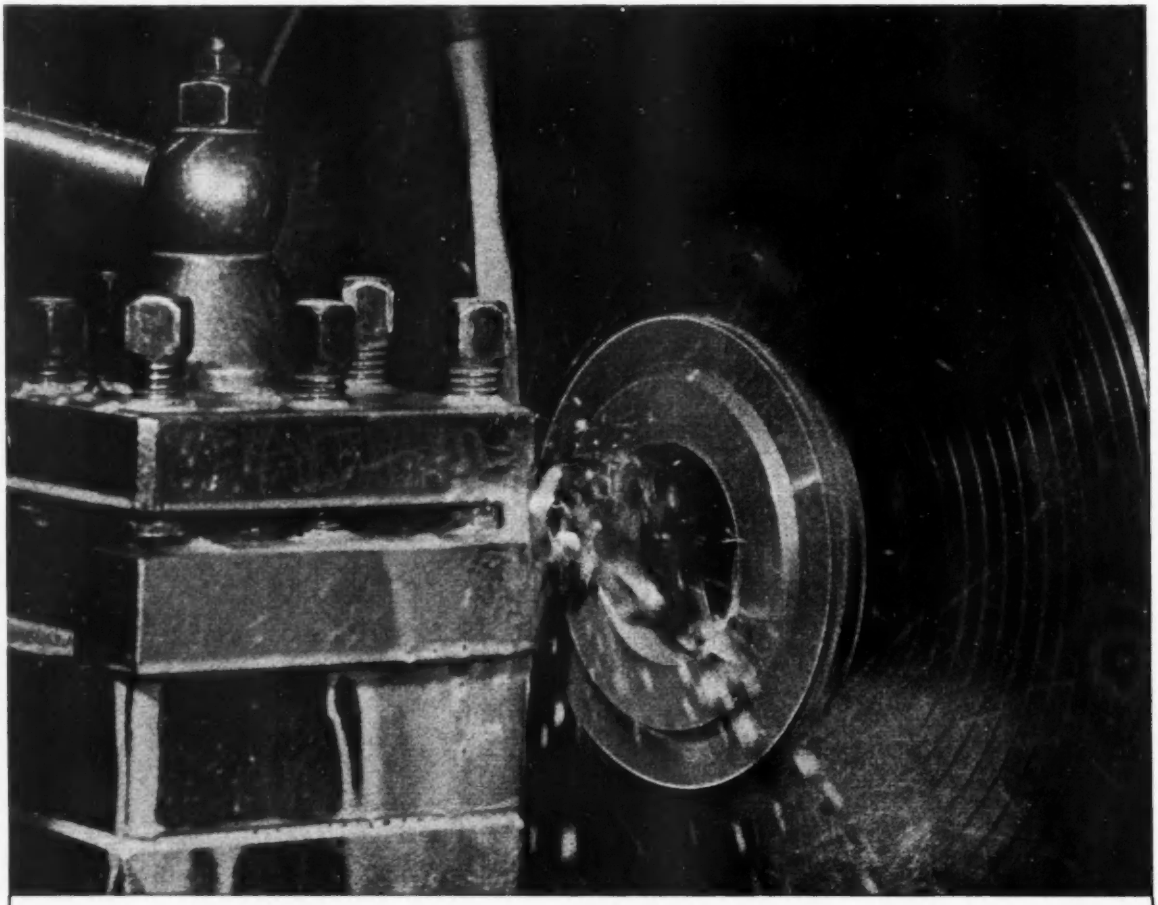

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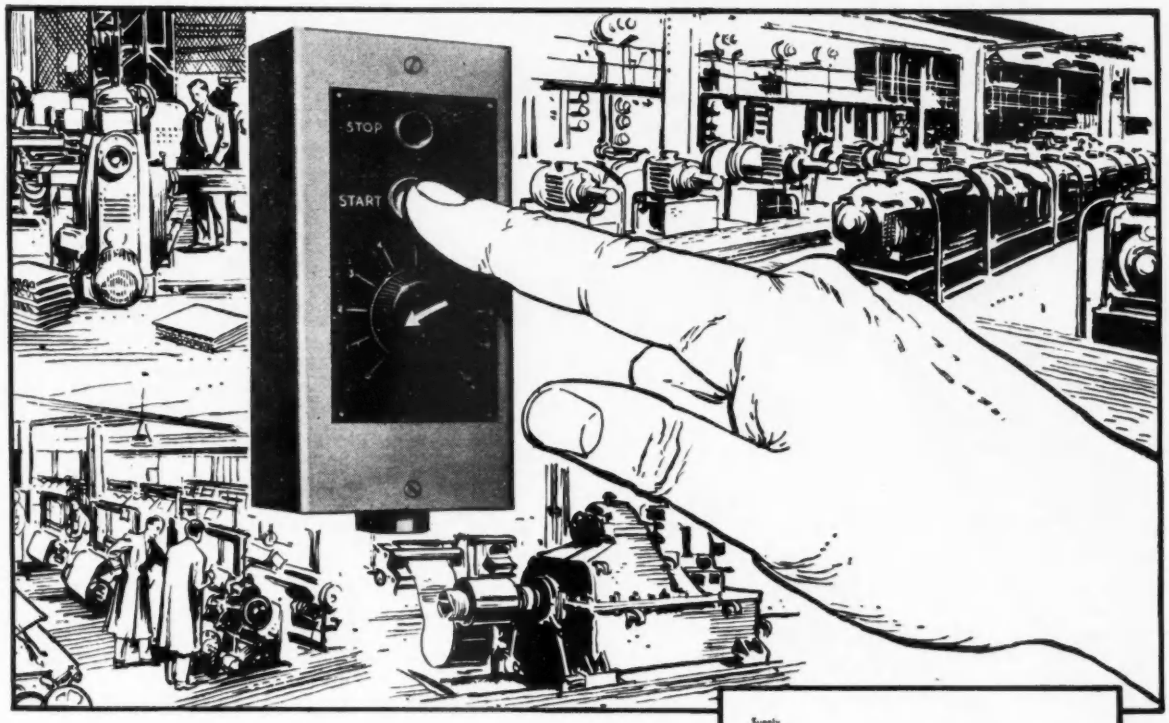

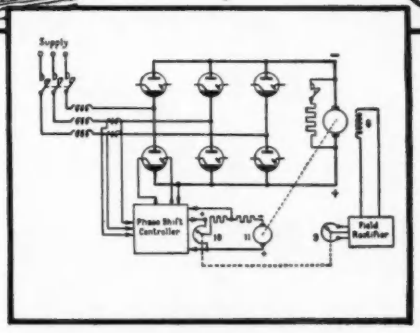

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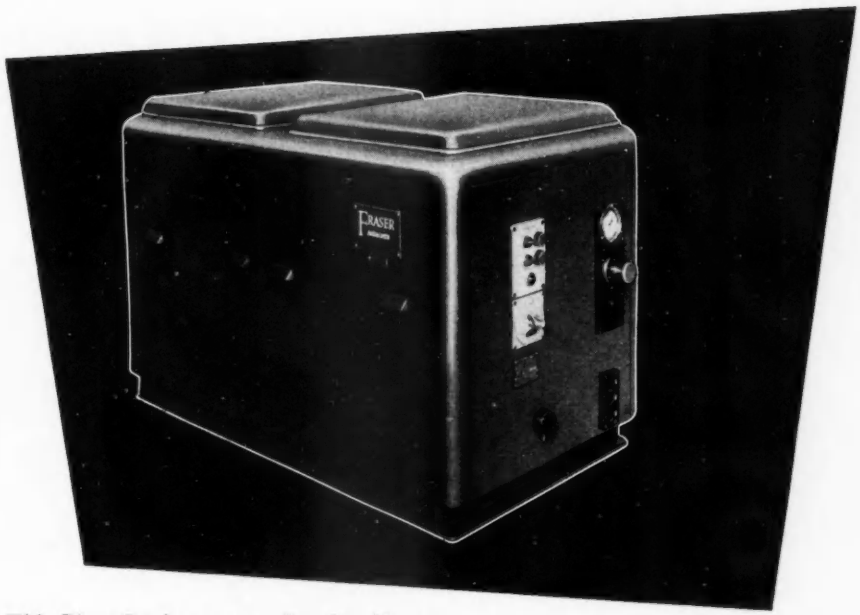

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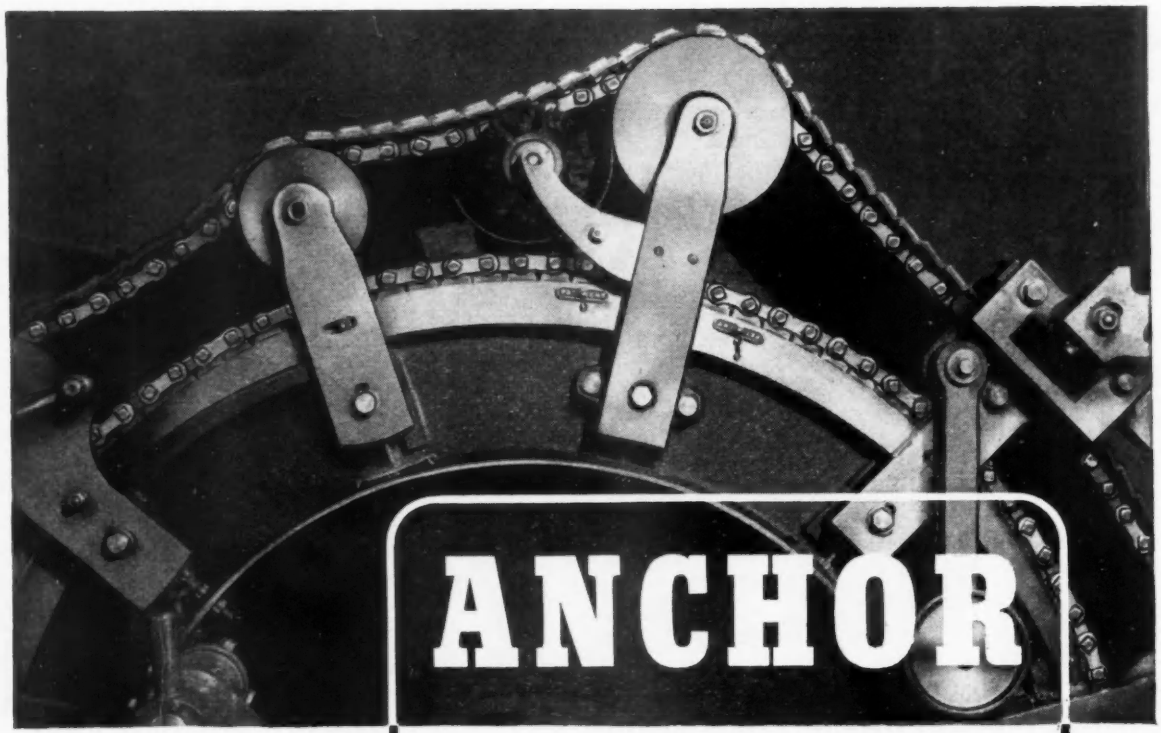

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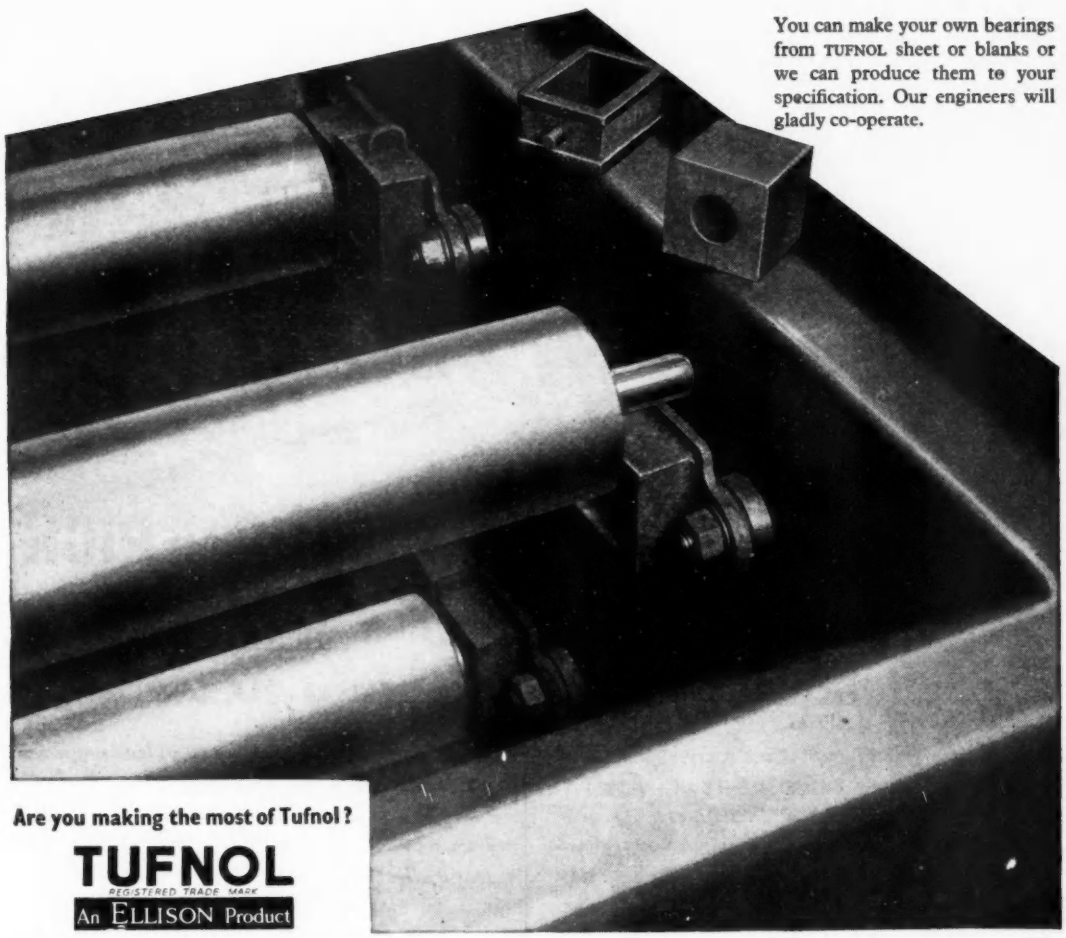

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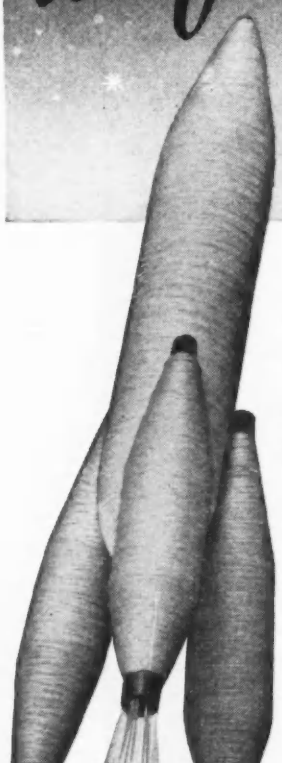

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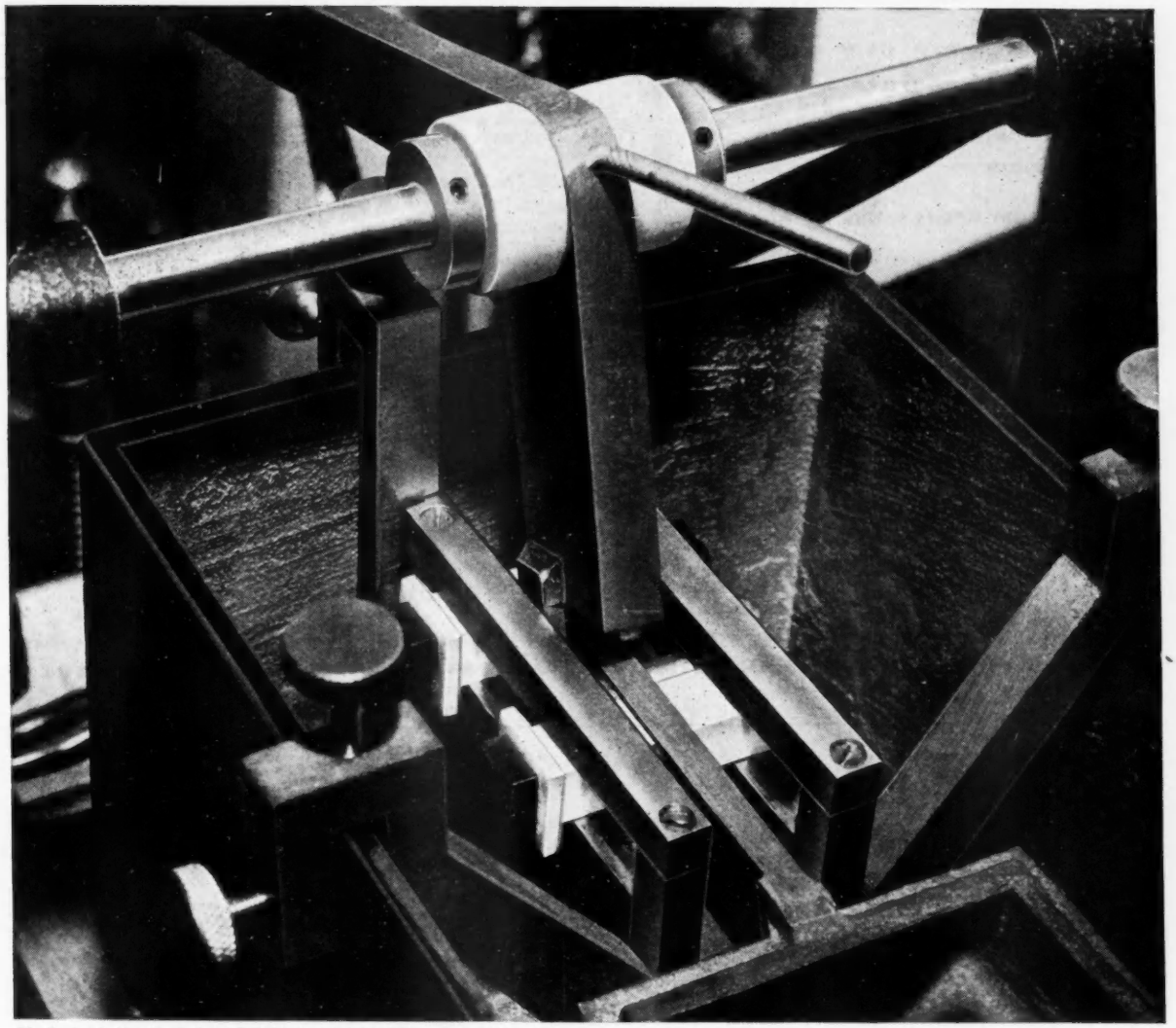

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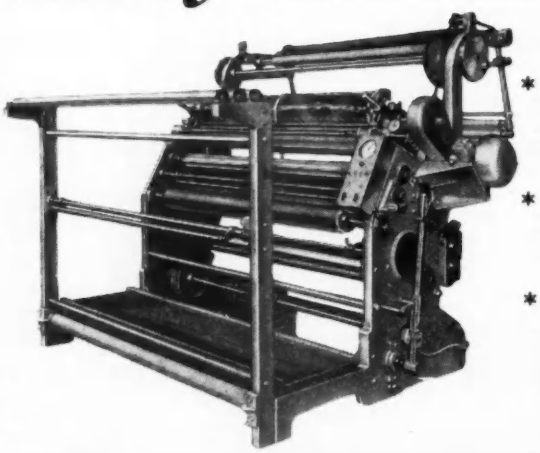

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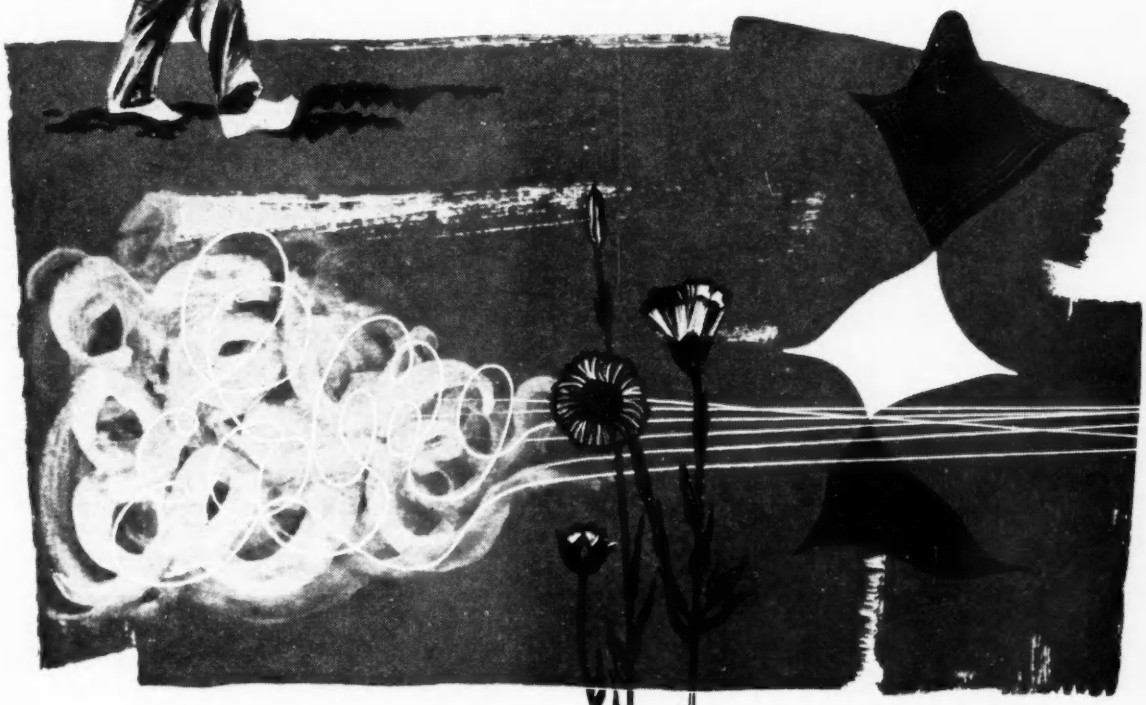

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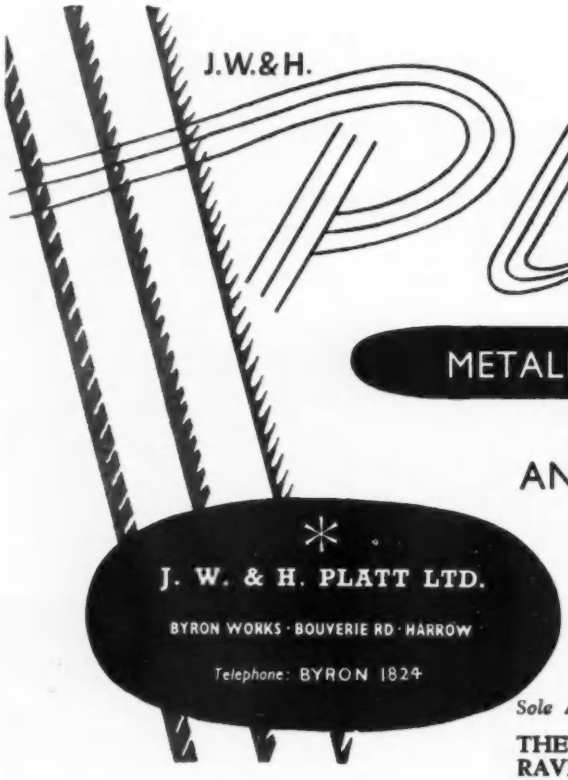

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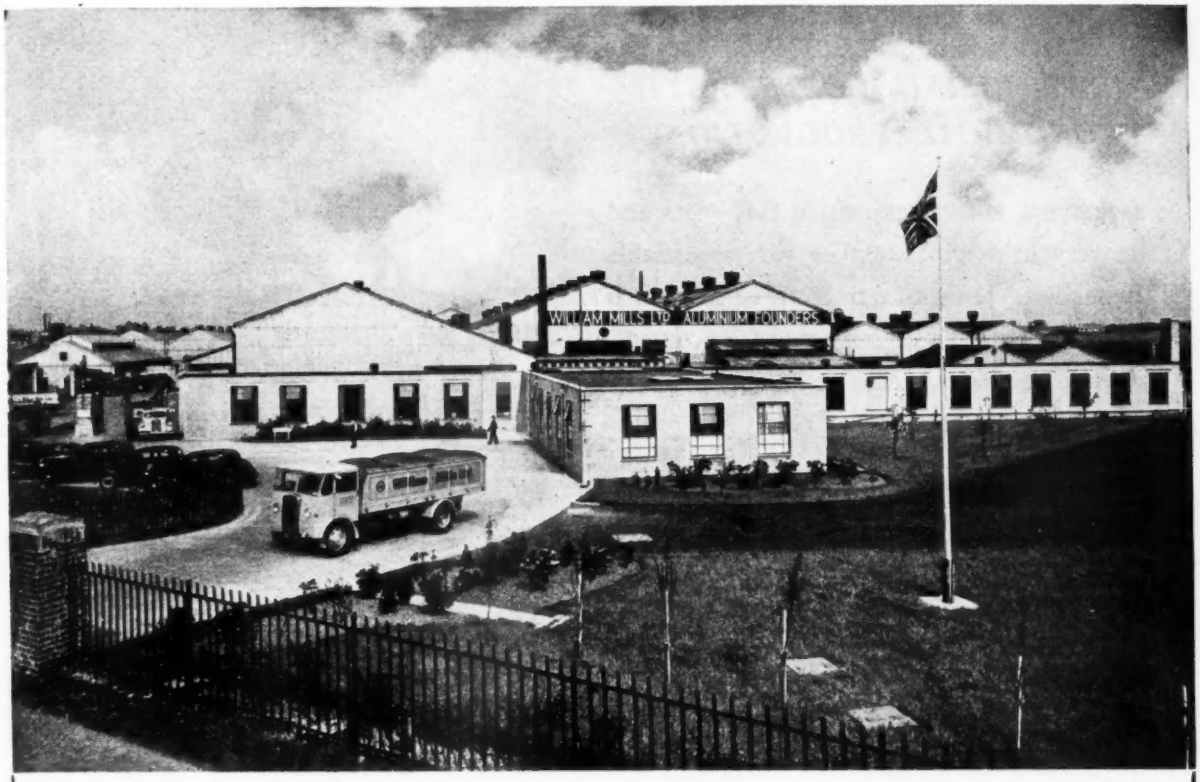

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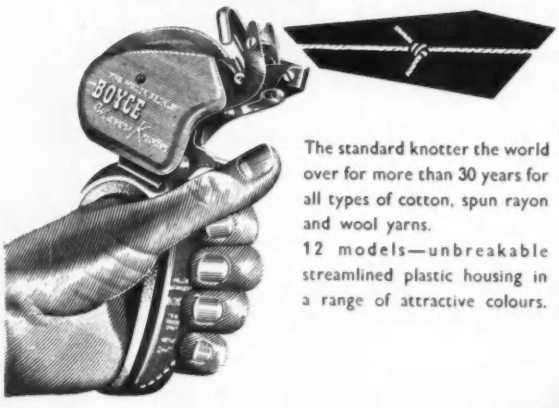

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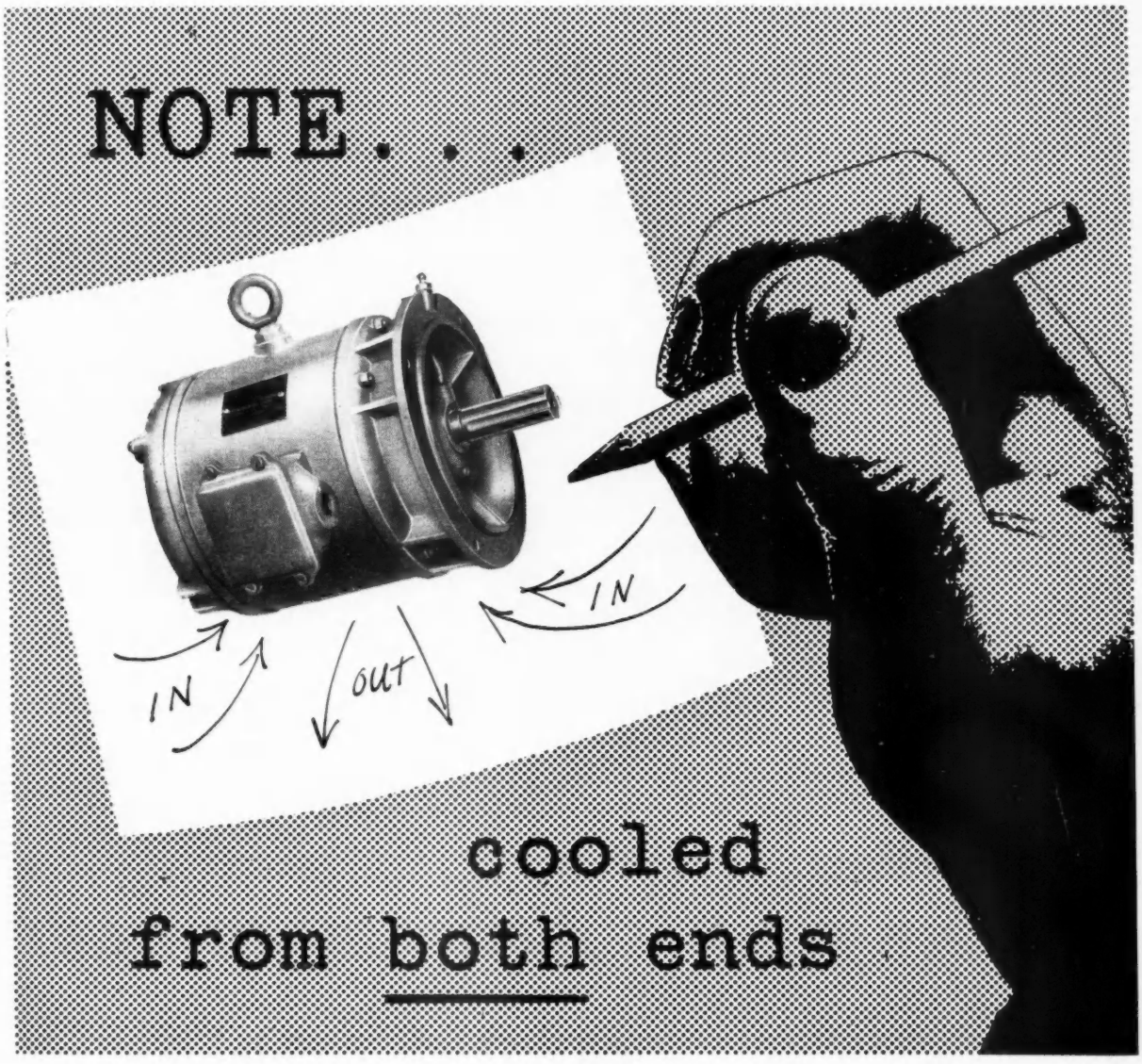

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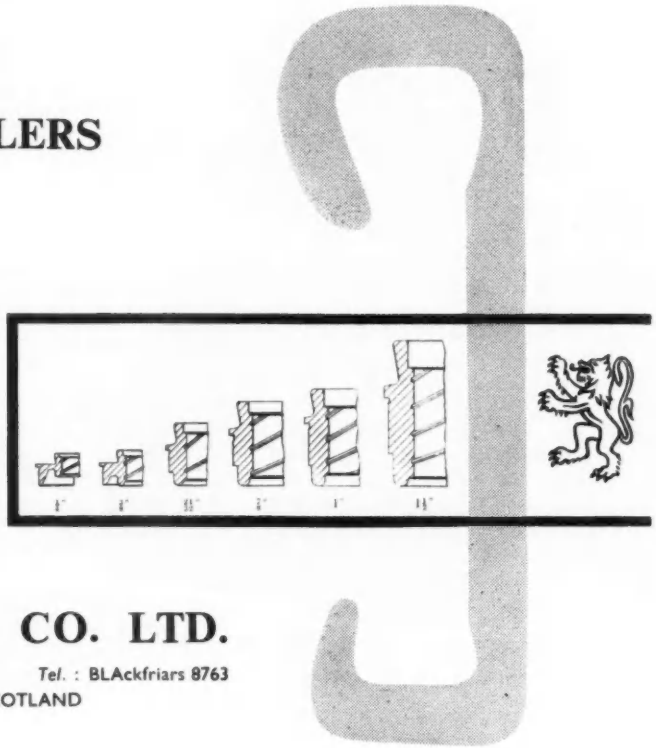

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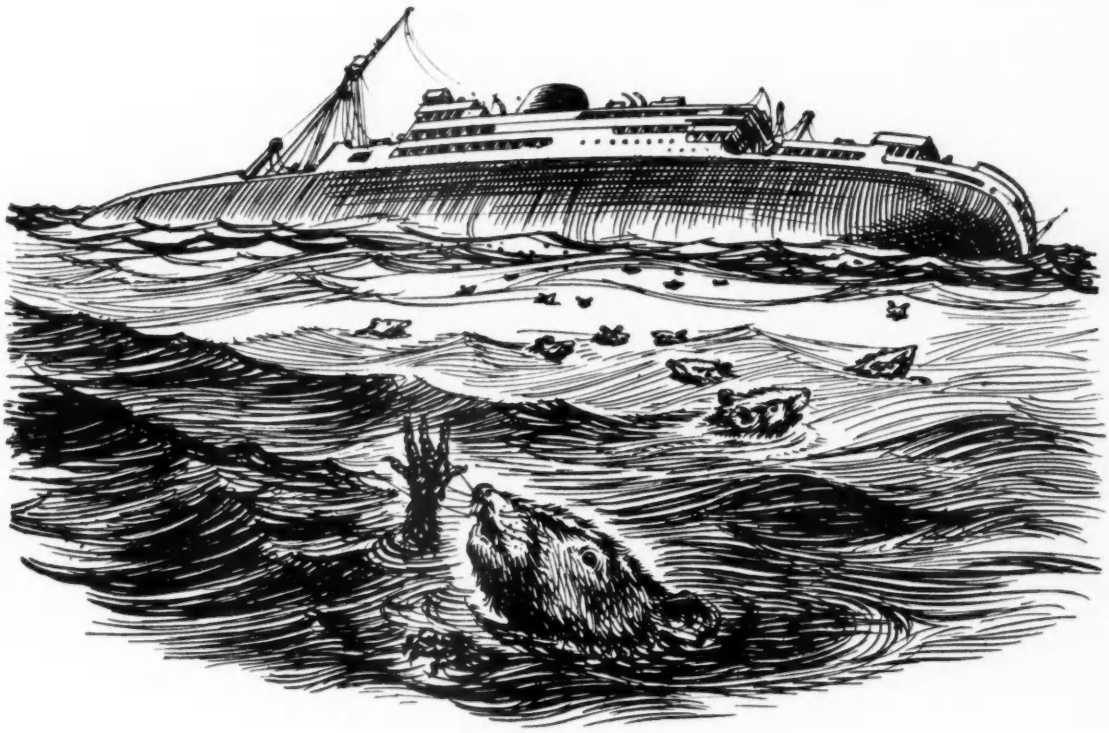

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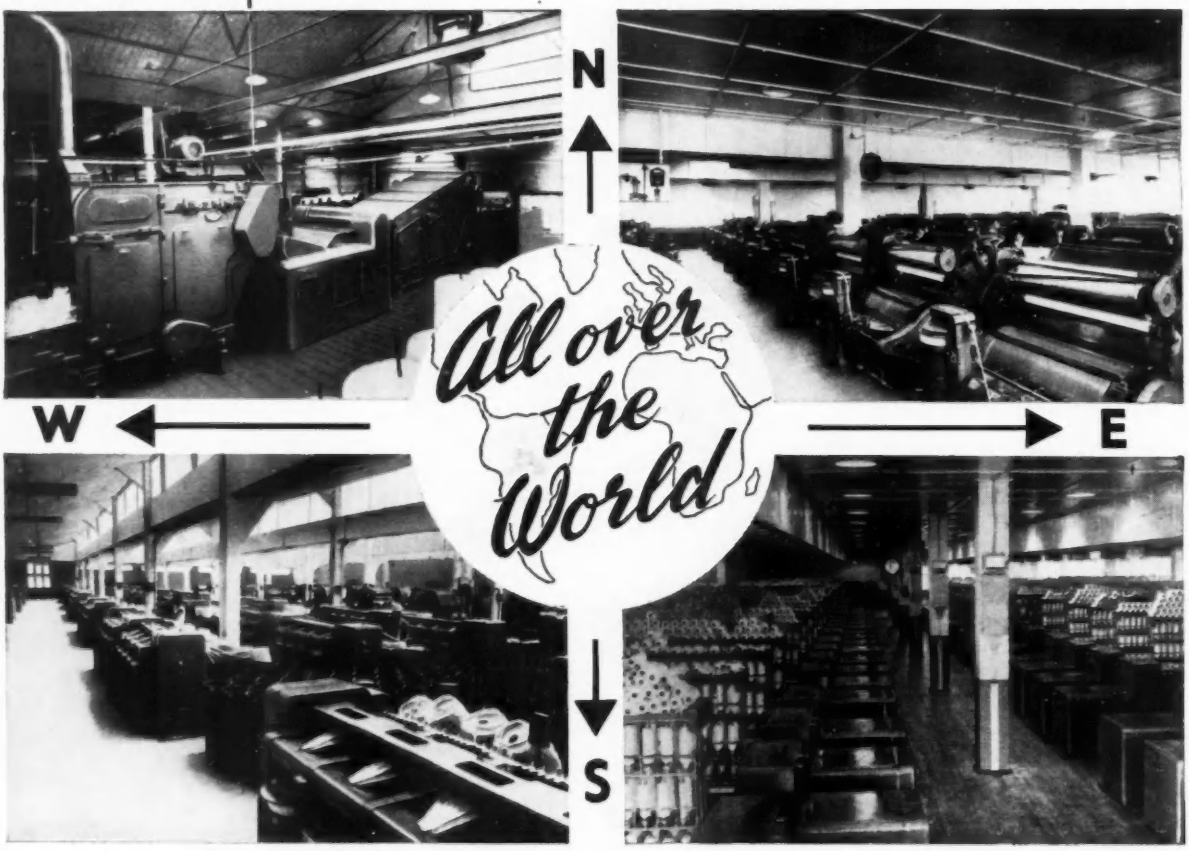

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MATERIALS - PROCESSES - PRODUCTION - MANAGEMENT

NO. 1003. VOL. 84 - JULY 1958 - MONTHLY Two Shillings and Sixpence

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THE TEXTILE MANUFACTURER (*Incorporating* TEXTILE INDUSTRY AND EXPORTER, THE TEXTILE MACHINIST, THE HOSIERY, LACE AND SILK MANUFACTURER, *and* THE TEXTILE COLOURIST) is published on the first Monday of every month.

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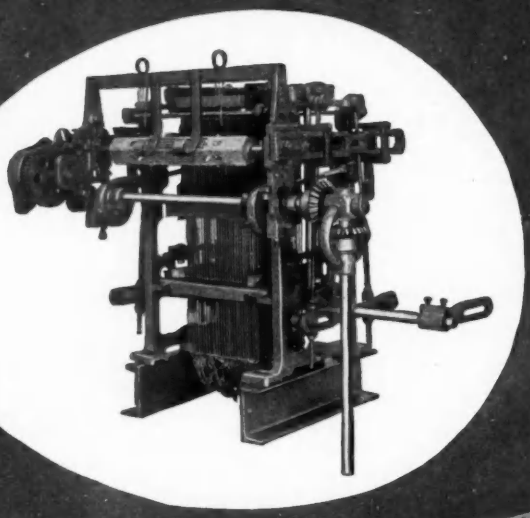

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No. 1003. Vol. 84 Two Shillings and Sixpence July, 1958

Notes of the Month

SMALLER WORLD WOOL CLIP

FOR the first time since the war, world wool production is expected to show a fall in the current season. This is the main point in a statistical report presented to the International Wool Conference recently held in Vienna, and which had been prepared in conjunction with the Commonwealth Economic Committee. World output in 1957-58 is estimated at some 5,020 mill. lb. (greasy basis), or 1% less than the revised total of 5,070 mill. lb. in the previous season. The reduction affects only merino wool, which is down by 4%, while crossbred and "other" (or carpet type) wools are expected to rise by 1 and 2% respectively. Wool textile activity in the free world was slightly higher in 1957 than 1956, taking the year as a whole, but the Committee emphasised a marked difference between the first six months or so, when most branches of the industry were working at near-record levels, and later months when activity was sharply reduced.

Wool consumption in the free world during 1957 is estimated at about 1% more than in 1956, and constituted a new record. Italy showed the greatest proportionate increase, though improvements were also recorded in Japan, France, Western Germany and Australia, but the U.K. and Belgium showed little change. By contrast, consumption in the U.S.A. registered a sharp full and was the lowest for nearly 20 years. A substantial reduction occurred in Uruguay, while more moderate falls were reported from the Netherlands and Canada. The volume of international trade in raw wool and wool goods was well maintained in 1957, if the year is considered as a whole, though the good performance achieved in the first two quarters was followed by less satisfactory results in the closing months.

* * *

EMPIRE COTTON

AT the recent annual meeting of the Empire Cotton Growing Corporation, Lord Derby (president of Council) reviewed the work of the overseas staff. The task of plant breeders was to ensure continuity of supplies of pure seed and to produce higher yielding, and where necessary, better quality types. Samples of all strains were regularly sent to Shirley Institute to make sure they would be suitable to spinners. Other members of the staff were concerned with controlling and keeping in check attacks of pests and diseases, and devising means by which more cotton could be grown on the same land. The success which had resulted from the combined work of the Corporation and the Departments of Agriculture could be judged by production figures. In 1947-48 the total cotton crop in the eight territories in which Corporation staff were working was only just over half a million bales. Today it was nearly one and a half million.

Mr. J. Littlewood (chairman of Council), congratulated Uganda on its 50 years of cotton growing, and said that improved strains would enhance the already high reputation of its cotton. The 1958 crop of 350,000 bales had proved larger than had been expected, whilst the Tanganyika crop, though slightly reduced after four consecutive record seasons, was still excellent by comparison with previous years. In Kenya, efforts to persuade growers to plant early and farm well were sure to increase production in the long run, and in Nyasaland it was hoped that methods of controlling insect pests would result from the work of the Federation research team studying the problem. The great fall in the Sudan crop was expected to be only a temporary setback, due largely to unfavourable climate. The steady Aden production of some 30,000 bales was very satisfactory after only ten years of cotton growing, and considerable progress was being made by the Corporation's research team there. In the West Indies, preliminary indications were that the change of planting dates in Montserrat and St. Kitts would prove beneficial.

Mr. H. E. King, senior officer of the Corporation in Nigeria, said that the replacement of the old stocks of Nigerian Allen by the higher yielding and less neppy Samaru 26C had contributed to the spectacular increase in recent years. The current crop of over 240,000 bales compared with an average of under 50,000 bales for the five years immediately after the war, and great credit was due to the British Cotton Growing Association for the competent way in which they had dealt with the five-fold inerease. Continuous breeding work on the same stock had produced Samaru 26J, still typically of Allen character, but just appreciably longer and finer than 26C. Higher and more consistent yields might well result from investigations into better methods of utilising the variable rainfall, and insect pest problems were being studied with encouraging results. Seed dressings had proved a highly profitable means of protecting seedlings against bacterial blight disease.

* * *

DUMPING OF LINENS

ONE of the reasons for the present difficulties of the linen industry in Scotland was the tremendous importation of kitchen towellings and other cloths from "iron curtain" and also certain Commonwealth countries, stated Mr. R. L. Arthur (P.R.O. to the Scottish linen trade) in a recent talk to St. Andrew's Rotary Club. On the basis of information collected there appeared to be grounds for suggesting to

the government that the anti-dumping regulations should be applied. Most of the cheaply produced kitchen towelling he said, came from Hungary, Poland and Czechoslovakia under an umbrella type of agreement based on monetary values and, while it was wrong to curb trade between nations, there was a limit to what appeared to be fair trading. There was the recent case of New Zealand butter and it was of interest that one firm exporting a flax boot had reported that a licence for a substantial order had been stopped by that good Commonwealth customer. The kitchen linen coming into this country was sold at prices lower than Scottish looms could produce and there were indications goods were sold at prices lower than the people in the country of origin were asked to pay.

People should realise that between £20,000,000 and £30,000,000 of Scottish capital was invested in the flax industry and that was something we ought to be particularly proud to acclaim continued, Mr. Arthur. There was far too much "cap in hand" begging going on in England and overseas, particularly America, to get new industries to come to Scotland. While these industries were welcome it was stirring to know that Scots risked their capital in industries and got far from their fair share of the limelight for doing so. The Scottish linen trade was at present engaged in producing a high quality all-purpose linen kitchen cloth that had been tested for its outstanding qualities for drying. It was being launched in the autumn backed by a mark of certification to prove its worthiness, and should be ready for Scottish Week. This step was being taken at a time when the cheaply produced foreign towels were literally swamping the market in their millions. In the heavy end or industrial canvas side of the trade firms had been bringing out new lightweight cloths, proofings, and colourings. Linen products were 10% cheaper in price to the customer today than they were a few months ago.

* * *

WORLD COTTON SITUATION

An annual review of the world cotton situation was presented at a meeting of the International Cotton Advisory Committee held recently in London. The basic fact about the present situation is that disappearance has again exceeded production and by a wider margin than in 1956-57 and the world carryover on August 1 this year will be the smallest for several years. After several years of continuous expansion, consumption is declining in many countries and competition from other fibres, particularly the newer synthetics, continues. In some producing countries, revenues have been materially affected by the reduction in both the volume and value of cotton exports and carryover stocks are expected to increase. The stock position at the beginning of the present season gave cause for some satisfaction. The U.S. had been able to reduce its carryover by over three million bales without any undue increase in other exporting countries. Importing countries had increased their stocks by over one million bales.

Acreage restrictions in the U.S. caused production to fall to 10·9 million bales, over two million bales less than in 1956-57, and, apart from 1950-51, the smallest crop since the end of the war. Aggregate production in other free world countries, estimated at 16·4 million bales, sets a new record and is 400,000 bales higher than in 1956-57. Larger crops have been harvested in Mexico, the United Arab Republic, British Africa and Argentine but production is noticeably lower in the Sudan, Turkey and Uganda. Production in the U.S.S.R. is estimated to be about half a million bales less than last season but may be higher in China. All told world production is estimated at 39·3 million bales, roughly two million bales less than in 1956-57 and the smallest world crop since 1951-52.

In the last five years, world consumption has increased by an average rate of nearly 1·5 million bales per year culminating in last season's record 42 million bales. However, consumption during the present season will decline, probably by half a million bales or more. The United States textile industry is still in a recessionary phase and consumption in Canada will fall to near its lowest level for the post-war period. In Western Europe, there are signs of excess textile production, inventories have been rising and consumption has moved lower in many countries. Curtailments presently in force in Japan will result in a significantly lower consumption and after a long period of uninterrupted expansion, consumption in India is expected to decline this season. In the aggregate little variation in consumption outside these main consuming countries is in prospect this season.

Free world exports in 1956-57 were boosted to a record 14·3 million bales but recently the pendulum has swung the other way. Declining consumption, payments difficulties in several countries and some degree of uncertainty over the future trend of cotton prices are likely to result in a sizeable reduction in foreign trade this season with aggregate exports of about 12·5 million bales. Based on sales to date under the U.S. special export programme, exports from this country would be around 5·7 million bales. Aggregate exports from other countries should be roughly on a par with last season. The trade situation has improved in the U.A.R., Mexico and the Central American countries and this will be a good season for the smaller African producers. In contrast, however, exports from many other countries are presently running well under last season's rate with India, Pakistan, the Sudan and Greece the most seriously affected.

World production next season will be influenced to a large extent by what happens in the U.S., where, with nearly five million acres in the Soil Bank, production will again decline unless there is an offsetting improvement in yield with a much smaller carryover, supply will almost certainly show a marked reduction next season. Acreage is likely to increase in Mexico. Elsewhere there is apparently no lack of enthusiasm for cotton growing. Government policy is geared to stimulating production, domestic consumption is now a more important component of total demand and exports have continued favourable in many countries. Communist countries are committed to stepping up cotton production considerably in the next few years and the conclusion is, therefore, that cotton acreage outside the U.S. should be maintained at a relatively high level.

Consumption prospects in many countries during the first half of the 1958-59 season do not seem as favourable. There are few signs of any real recovery in the U.S. textile industry. Rising imports are detrimental to textile interests in Canada and the U.K. and the European industry may now be entering a period of reduced activity. The situation in Japan would have to alter radically for textile production to go completely unregulated next season and an improvement in the inventory situation should precede any resumption in the upward trend in consumption in India.

Modern Wool Blending Systems*

In woollen blending distribution of all the constituents must be thoroughly carried out to ensure that every inch of yarn contains the correct proportion of each type and colour

By W. M. ODDIE†

WOOLLEN cloth is usually composed of a variety of raw materials but so wide is the range of cloths and so varied the raw materials available that blending assumes an increasingly important place and represents a more complex process than in any of the many other fabrics produced in the textile industry.

The mechanical structure of a blanket is obviously quite different from that of a light weight suiting yet blankets vary from pure cashmere down to "grey" types in which there may be no virgin wool at all. In fact, the art in the woollen industry is the production of a good looking hard wearing cloth with a good "feel" about it from the least expensive raw materials some of which are chosen for tensile strength, some for raising properties, some because they "felt" in milling and some merely because they are cheap.

The designer has at his disposal this enormous variety of raw material and to the exasperation of the blending manager thinks nothing of calling for a yarn made from anything up to 15 different types of raw material, each of which may be present in a different colour in order to produce the finish and shade he has in mind.

This introduces another aspect of woollen blending not so commonly found in blending cotton, worsted, etc. fabrics in that stock dyeing is the rule rather than the exception and this means that distribution of the ingredients must be thoroughly and evenly carried out to ensure every inch of yarn contains the correct proportion of each type and colour if the resultant piece is to be free from soft spots which will show up in milling and/or irregularities in the colour of the yarn which will produce weft bars.

The determination of the shade of the yarn—and there could be several shades in a check cloth, for example—therefore depends on the correct mixing of various coloured types of stock each of which may be represented by a different quality and a different staple length, but probably the most difficult blend of all is that required in the production of yarns for solid shades where no pattern in the cloth can hide unevenness. A steel grey flannel in any of its various shades is a nightmare to produce even though the blend may consist of black and white wools only in the proportions required to give a light or dark effect.

Preparation

The first essential to good blending is the preparation of the raw materials. Greasy wools (except for certain carpet and blanket yarns), must be scoured; an obvious pre-requisite to stock dyeing. Dusty wools should be shaken and opened whilst laps and long threads as well as press packed synthetics should be "burst." In some blends there may be present a very small percentage of a type or colour and it is then necessary to make a pre-mixing or "melling" consisting of all the small lot, or lots, together with a proportion of one of the major ingredients. Quite often the two processes of "bursting" and "melling" may be combined as, e.g., in an actual blend containing 98% black and 2% white in the form of laps. Here the laps together with say 20% of the black are passed together through the primary opener and the resultant mixture representing all the white laps in opened condition spread amongst the 20% of black now represents approximately 20% of the final blend and may be added to the remainder of the black with increased certainty that the white content will be evenly distributed.

The old method of proportioning the various ingredients of a blend was to build up a bed of layers representing the different types or colours to be incorporated, applying oil or emulsion as a carding lubricant layer by layer. This operation might well occupy three or four men for several hours during which time the opening machine would be idle. The completed bed or "liter" was then "pulled down" or cut through vertically in order that each cut represented—in theory—a cross section of the ingredients to be opened and mixed. Each cut was fed to the opening machine from which it was transported by hand, or pneumatically, to a second bed and on completion of this bed, fed back through the machine for baling up. In many instances materials passed through the

Fig. 1. The "start point." A suction trap in duct coupled to a special fan

* *From a lecture given recently to Batley Textile Society.*

† *Managing Director, Spencer and Halstead Ltd., Ossett.*

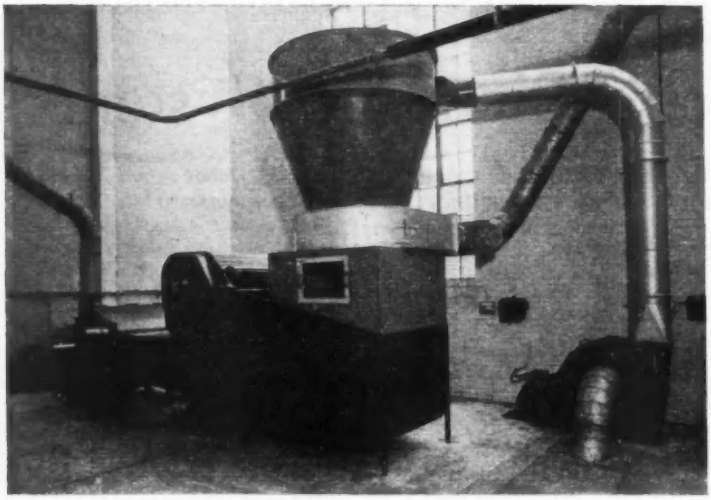


Fig. 2. The various colours or types follow each other through a fan to a dust removing cyclone

machine three or four times in order to effect rebedding and improve mixing. There were of course many variations of this procedure but the basic principles and waste of time and effort were inherent.

Modern Methods

In modern practice the two main systems are batch blending in which the full weight of blend is processed as a unit, and continuous blending where the ingredients enter the system at one end and emerge in a continuous stream of opened, mixed and oiled blend at the other. Which type will best suit a particular application depends on many factors and can only be determined after careful study by experienced manufacturers of the equipment involved. Generally speaking batch blending is "safer" where many types or colours are to be blended together whilst continuous blending is quicker and requires less labour. Its principle application is in blending coarser materials for the production of carpet yarns, blanket yarns and rug wools.

In batch blending the materials are weighed in bales representing the various bulk proportions of each type or colour and, after shaking to remove dust or "melling" to absorb very small lots, are arranged round the "start point" (Fig. 1) consisting of a suction trap in a duct coupled to a special fan designed to handle fibrous materials without risk of clogging. Materials are fed into the trap in proportions determined by accepting a double handful as a unit and, for example, following two units of one type by three units of another and one unit of a third, etc.

The units representing the various colours or types follow each other through the fan (Fig. 2) which blows them to a dust removing cyclone fitted over the feed lattice of the opener or, preferably, over a hopper feed in front of the opener. The dust removing cyclone consists of two cyclones, one inside the other, the inner cyclone is constructed from perforated sheet steel and, whilst retaining the usable material which it delivers to the machine, allows the air stream together with dust, lime, shive, and short fibres to pass through the perforations into the outer cyclone from which it is deposited in a bag alongside. In cases where foreign matter is present in large quantities connection to a suction fan and dust collector may be provided. Since no oil or emulsion has been applied to the blend at this stage it will be obvious that considerable quantities

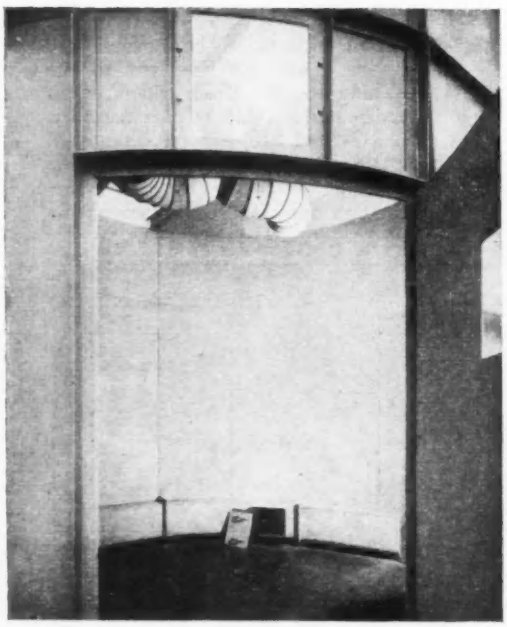


Fig. 3 (left). Rotary blender operated solely by air pressure

Fig. 4 (right). Vertical cuts through the blend built up in the first bin are spread horizontally in the second

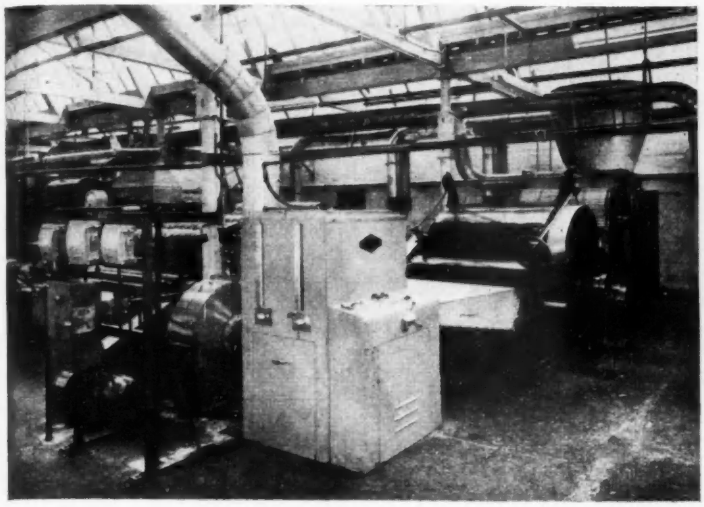


Fig. 5. Considerable progress has been made in the apparatus for oiling after opening

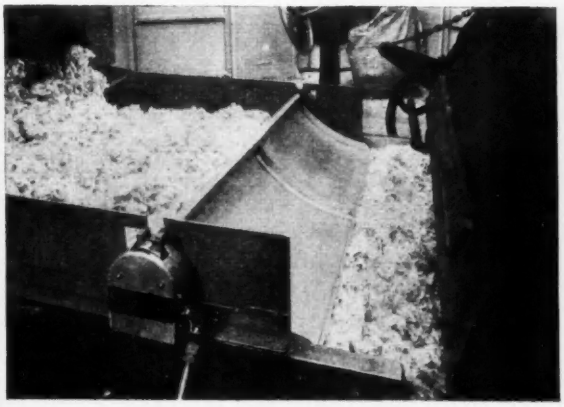


Fig. 6. Oil flow at a pre-set rate is synchronised with the flow of blend along the feed lattice

of foreign matter may be extracted in passing through the opener and the swift teeth, workers and strippers will remain free from the oily mass of dirt which normally accumulates on them.

After passing through the opener the materials are picked up by a second fan which blows them to a rotary blender (Fig. 3) operated solely by air pressure, and which distributes the opened fibres in an even bed formed within a bin of suitable size and, in modern plants, of circular steel panelled construction. Bins of this type have ceilings made from fine wire mesh to retain "fly" whilst allowing air to escape and are fitted with suction ducts arranged round the inside of the walls at floor level through which the blend, when completed, is extracted by a third fan. It should be noted that only the one operator feeding the raw materials into the "start point" has so far been employed and that proportioning, feeding of the opener and building of the first bed of blend have been carried out simultaneously.

In most cases, blends built up in the first bin are blown to a second rotary blender housed in a second bin for remixing. This operation may take place as often as desired without shortening of fibres since materials do not pass through the opener at this stage. Vertical cuts through the blend built up in the first bin (Fig. 4) are spread horizontally in the second which ensures complete "end for end" mixing. When the whole weight of blend has been transferred from the first bin to the second the operator cuts down the material, passes it through the suction duct in the bin and by manipulating the switches in the ductwork system returns the blend to the dust removal cyclone from which it passes through the opener for its final teazing, and the application of oil.

Oil Control

Oil or emulsion is now almost universally applied in the form of a spray directed on to the cleaned,

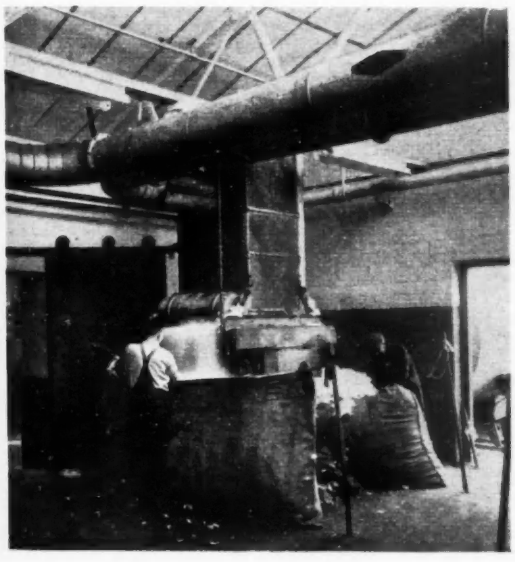


Fig. 7 (left). Openend, mixed and oiled blends may be baled by reversing lattice delivery machines

Fig. 8 (right). When possible blend might be blown behind or above the card hoppers

Fig. 9. An alternative to the method shown in Fig. 8

opened and mixed fibres as they leave the opener for the last time. In this way oil is applied only to clean fibre and not to dirt which must be subsequently fettled out of card clothing "worth its weight in oil" whilst the application of the spray to fibres in a lofty condition ensures even coating and results in economy in the amount of oil used. There are many recorded examples of savings up to 30%.

Great progress has been made in the apparatus employed for oiling after opening (Fig. 5) and many of the difficulties to be expected in any new device or technique have been overcome. Control of the quantity of oil delivered to the atomiser no longer depends on stable viscosity, regular pump or compressed air pressure and the delicate setting of a micrometer valve. These three factors, variation of any of which could upset flow calculations, have been replaced by gravity feed of oil or emulsion heated solely to maintain fluidity in the case of oleines, to a positive displacement variable delivery rotary meter which, once set by a single control cannot vary its output. The meter is driven by the same ½ h.p. motor which drives the small blower providing air for atomisation. No fine jets are incorporated and oil flow at the pre-set rate is synchronised with the flow of blend along the feed lattice of the opener (Fig. 6). Completely opened, mixed and oiled blends may be baled by reversing lattice delivery machines (Fig. 7) or when possible may be blown to bins behind or above the hoppers of the carding machines (Figs. 8 and 9).

Continuous System

In continuous blending systems the unit method of hand feeding is replaced by a method of weighing the ingredients in a box, or skip, with a capacity of 100 lbs. Each colour or type is represented in each 100-lb. weighing in the proportion, by weight, in which it is required as a percentage of the final blend. Thus, if a blend is to contain 20% of black then each 100-lb. weighing will include 20 lbs. of black and so on. As each 100-lb. weighing is completed it is passed to a hopper feed of special construction which levels out the flow to an even rate at which the opening machines can handle it.

Several different methods are available for transferring the weighing to the hopper including a side tipping skip (Fig. 10) delivering on to a lattice in a pit, a "drop" bottom skip (Fig. 11) operating in much the same way and a new system requiring no pit at all but consisting of a weigh box (Fig. 12) fitted with a lattice floor controlled by a push button starter also operating a transfer lattice forming a link between the weigh box and the hopper. The weigh box floor lattice and the transfer lattice run at the same high speed when it is desired to empty the box and as soon as the material is clear of the box the floor lattice stops and the transfer lattice automatically slows down to the same speed as the horizontal lattice in the hopper. By this means the hopper is always kept full and the time required to fill the weigh box usually from four to six minutes is made up by the speed of transfer from the box to the transfer lattice and so on to the hopper in due course.

The "Centriblender"

The weighed feed after passing through the hopper is delivered by fan to a rotary blender housed within a device termed a "Centriblender" (Fig. 13) in which the rotor is surrounded by a perforated cylinder some 8 ft. dia. to which a chute is attached at its upper end and which is also attached at its lower end to the extended box of a second hopper feed (Fig. 14). This extension box has a 10 ft. long x 4 ft. wide lattice slowly

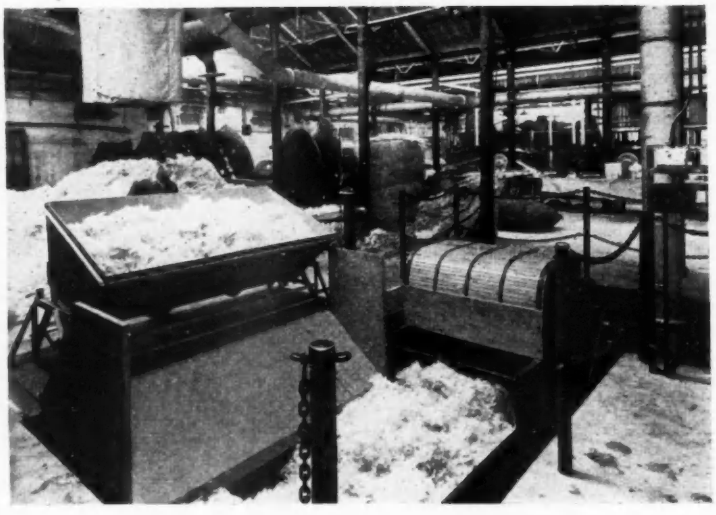


Fig. 10. Side tipping skip delivering on to a lattice in a pit

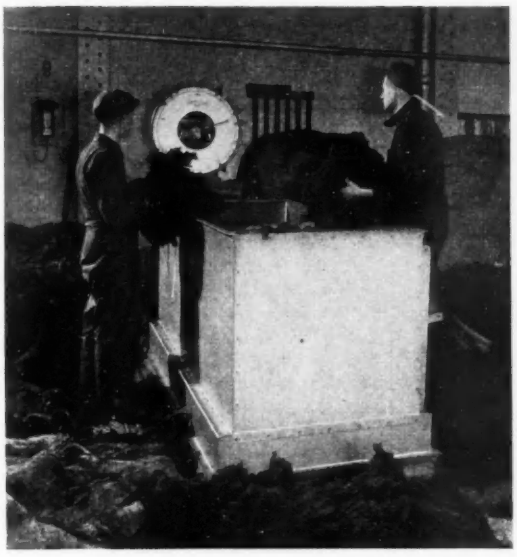


Fig. 11. A "drop" bottom skip

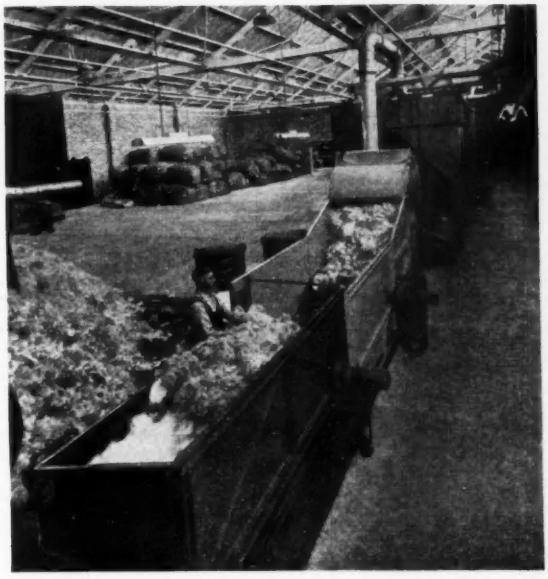
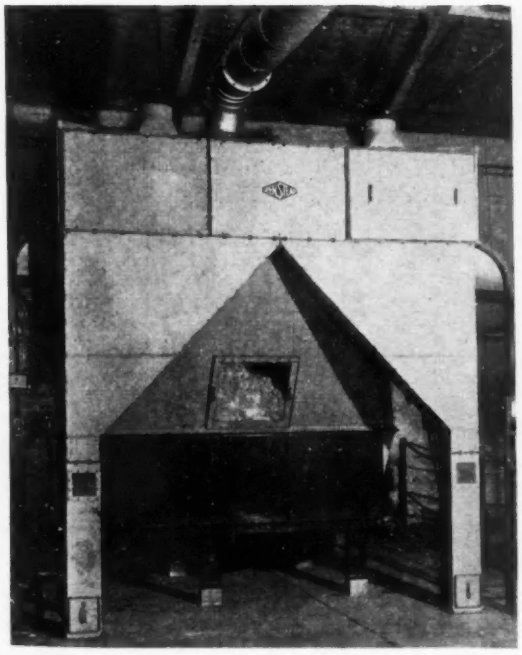


Fig. 12. Weigh box fitted with a lattice floor controlled by a push-button starter

progressing the mass of raw materials, distributed over its entire surface by the rotary action of the blender towards the inclined spiked lattice where an upward cut through the mass or bed is effected and the regulated amount so extracted is continuously fed to the first opener which is usually a picker.

Again the opened materials are conveyed by fan from the picker to a second "Centriblender" where further distribution and mixing take place before the integral hopper feeds them to the second opener, in this case a tenter hook willey or a fearnought. Careful control of the speeds of the various succeeding lattices is required in order to compensate for the fact that as the materials progress through the system, their density reduces in proportion to the amount of opening to which they have been subjected whereas the weight of material passing each point must not vary otherwise choking or "starving" would result.

The "Centriblenders" serve the dual purpose of mixing and dust extraction since the carrying air stream along with foreign matter



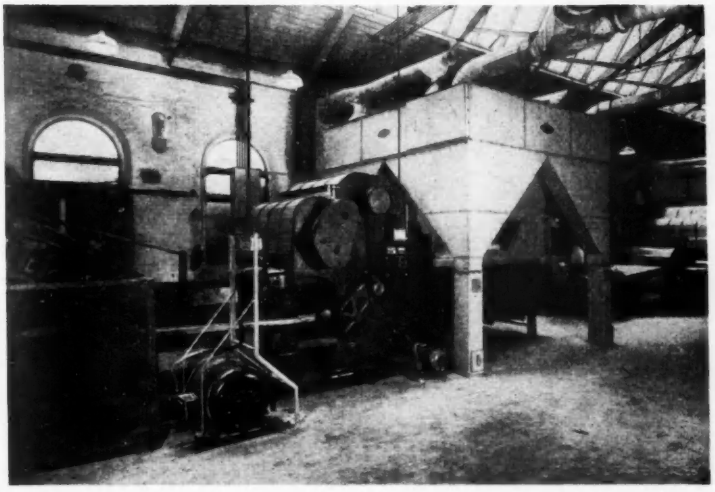


Fig. 14 (above). The second hopper feed and "Centriblender"

Fig. 13 (left). The "Centriblender" in which the rotor is surrounded by a perforated cylinder

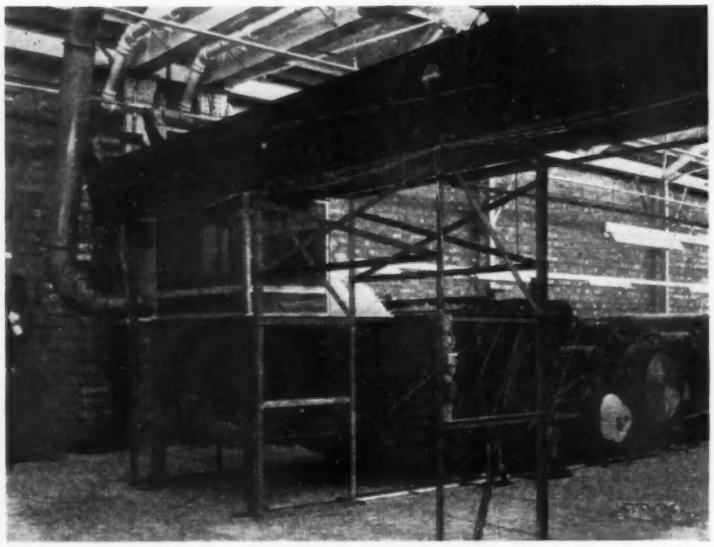


Fig. 15. A system of overlapping lattices above extended receiving boxes of card hoppers, each reversing its direction for a given period at pre-determined intervals has been installed

passes through the perforations in the cylinder surrounding the rotary blender and settlement takes place in the hollow supporting legs of the device. Suction extraction of the collected material may be employed in cases where large quantities are encountered.

Only one operator is required to feed raw materials to the weigh box and since all subsequent operations are automatic no further labour need be employed unless blends must be baled up or, in the case of delivery to bins behind or above the card hoppers, one further operator may feed up to 20 cards. In one installation two men feed 44 cards.

The ultimate in labour saving is only possible where a number of cards operate continuously on the same blend for long periods but where these conditions obtain a system of overlapping lattices above extended receiving boxes of card hoppers, each reversing its direction for a given period at pre-determined intervals can be, and in fact has been, installed. (Fig. 15.) This system after some 12 months successful operation, establishes that a single operator, feeding the weigh box of the continuous blending plant can without further assistance keep eight cards running on carpet yarn production at an overall production rate of 800 lbs. per hour, extensible to 1,500 lbs. per hour as and when additional cards are installed.

Optical Brightening Agents

WELL over 100 British patents had been granted and some 30 or more manufacturers throughout the world were now producing a range of between 150 and 200 different optical brightening agents, said Dr. D. A. W. Adams (Research and Development Director, Hickson and Welch Limited) in a recent address to the West Riding Junior Branch of the Society of Dyers and Colourists. In 1955 production in the U.S.A. was 1,375 tons—double the figure three years previously. Today the production there was still higher—a sales' value of 15,000,000 dollars had been quoted—and the world production must be at least 2,500 tons. Prices had dropped steadily over this period to figures of between 15s. and 40s. per lb., depending on strength, complexity, properties, etc.

The fact that optical brightening agents added blueness to a fabric meant, of course, that they must have some effect on coloured materials. The effect on deep shades was negligible but quite marked effects could be produced on pastel shades, the effect being slightly different dependent on whether the optical brightening agent had a reddish or greenish blue hue. In general, it might be said that yellow pastel shades would appear paler, pinks would appear purple, blues would be brighter and stronger, and greens would be bluer and brighter. Fawns, greys, etc., would all be bluer.

The light fastness of optical brightening agents was also important, both as regards actual fastness and effect on dyed materials. Most products today had at least moderate fastness and were completely free from the tendency to discolour. Dr. Adams said that, as regards toxicity, there appeared to be no grounds for supposing that optical brightening agents were toxic.

By far the biggest usage of optical brightening agents was still for incorporation in soaps and detergents for washing cellulosic fibres. To be satisfactory for this purpose, an optical brightening agent must (*a*) be capable of being dissolved or dispersed uniformly in the soap or detergent mix, (*b*) be stable to the temperature used in the spray drying process, (*c*) be stable to other agents present such as perborates, (*d*) have reasonably high substantivity so that a good effect was obtained on a single wash, (*e*) give a good build-up over 5 - 10 washes but not so high that an undesirable shade was produced, and (*f*) be effective over all normal washing temperatures.

Many white cotton goods were now treated with an optical bleach during some stage of production and they might be applied as part of the bleaching process or as an after-treatment either by exhaust methods, as in dyeing with direct cotton dyestuffs, or by padding. With wool, fastness to light was generally inferior to the general level of fastness on cellulosic materials.

Only a few of the optical brightening agents suitable for cotton had an affinity for nylon; in general, either the special types suitable for wool, or special dispersed or cationic types were employed.

Colour and Design in New Dress Cloths

Featured on the facing page is a selection from the latest ranges of "Bilanjo" fabrics manufactured by J. Blackledge and Son Ltd., Park Mills, Chorley, Lancs. Brief details of these quality dress fabrics are as follows:—

(1) "Dubslub" crease resist spun rayon in many different colour-ways (36 ins. finished).

(2) Printed Bedford cord in five distinctive colour-ways (100% cotton, 36 ins. finished).

(3) "Wattle Flower" inlay embossed 100% cotton dress print in six bright colour-ways (36 ins. finished).

(4) Design 7427. An unusual clear-cut design in six bold, contrasty colour-ways (100% cotton, 36 ins. finished).

(5) Design 7230. In three colour-ways—crimson, light blue and navy—this smart bright print is 100% cotton.

(6) Design ST.665. Navy, light blue, shell pink and a lustrous shade of fawn are the four colour-ways of this novel print (36 ins. finished).

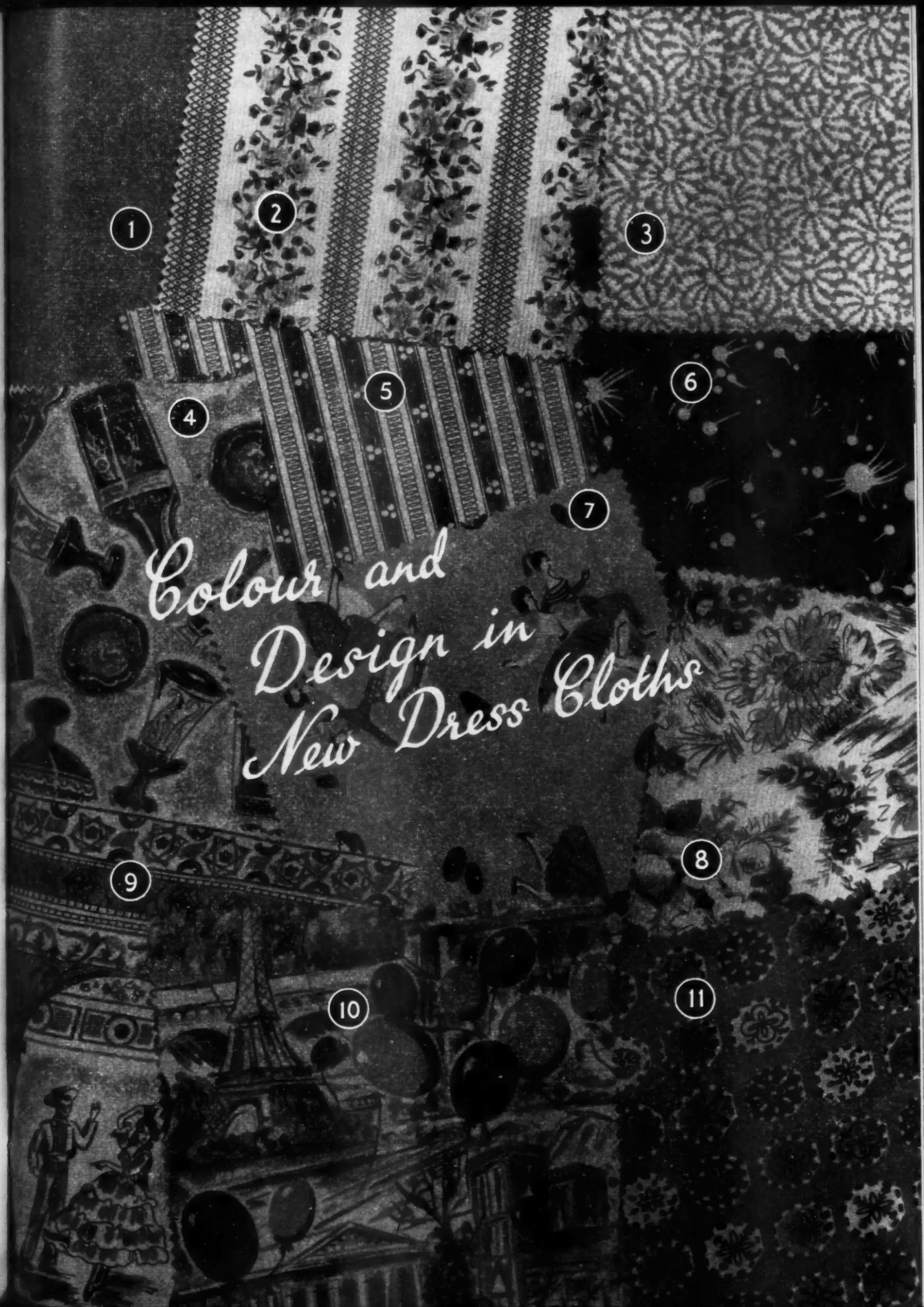
(7) Design KT.626. Available in five colour-ways this topical design is printed on 100% cotton (36 ins. finished).

(8) Design 14778. Bedford cord with a permanent embossed finish. In four, fresh colour-ways, it is 100% cotton (36 ins. finished).

(9) Design CQ.10571. Clean lines and originality characterise this fine print. In five colour-ways, it is 100% (36 ins. finished)

(10) Design 5638. A design that captures the holiday spirit. In five colour-ways, it is another 100% cotton (36 ins. finished).

(11) Design 4299A. Available in five colour-ways, the carefully chosen grounds provide maximum effect for symmetrical design.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Colour and Design in New Dress Cloths
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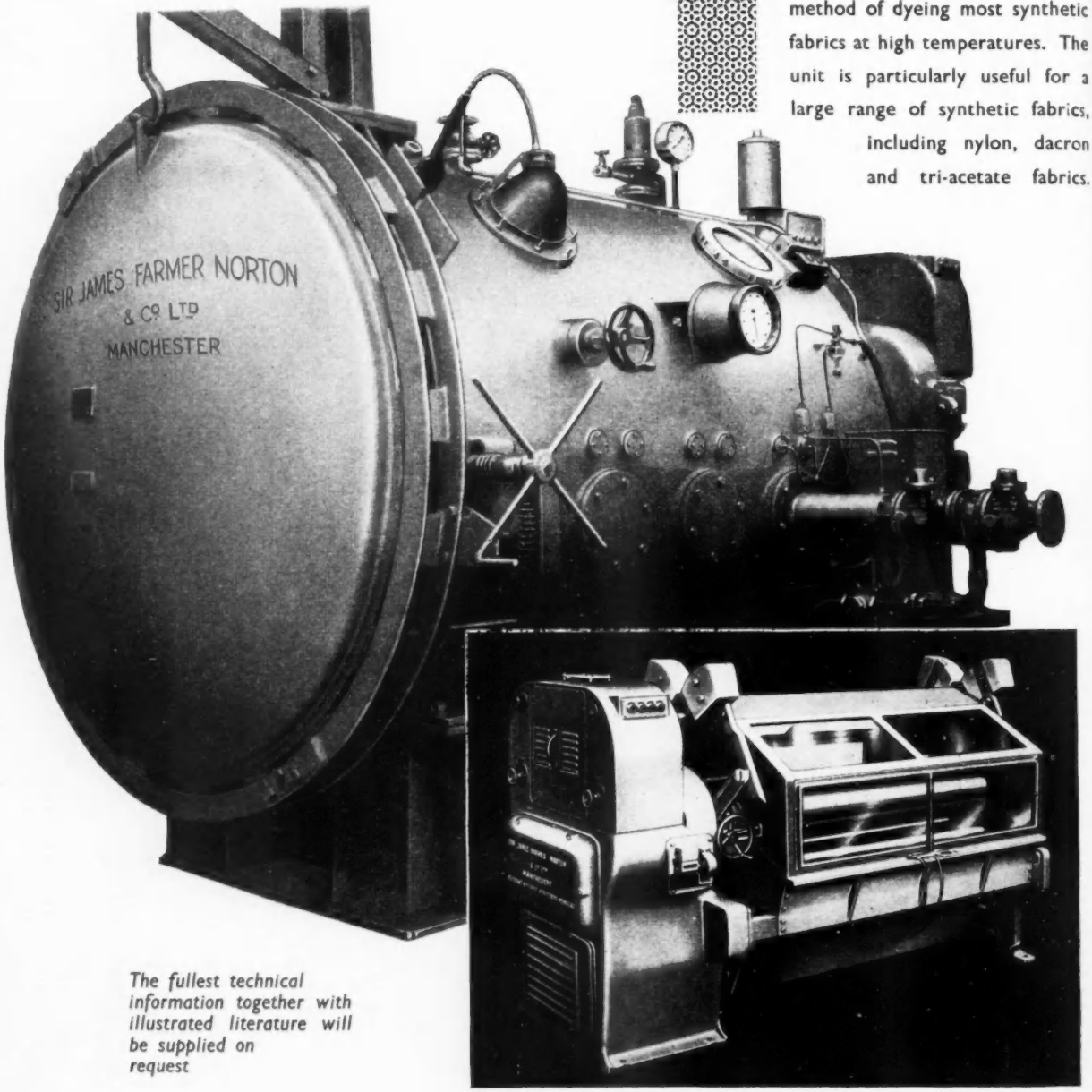
Introducing
The **NEW** Farmer Norton
PRESSURE DYE JIGGER

We have devoted a considerable amount of research to perfecting the Farmer Norton Pressure Dye Jigger and can confidently claim that this machine is the most satisfactory and quickest known method of dyeing most synthetic fabrics at high temperatures. The unit is particularly useful for a large range of synthetic fabrics, including nylon, dacron and tri-acetate fabrics.



The fullest technical information together with illustrated literature will be supplied on request

ALL-ELECTRIC CONTROLLED TENSION JIGGER

For really accurate tension control, and specially for light tension working, this type of machine is without rival and several hundreds are now in operation.

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Stretching and Heat Stabilising Thermoplastic Yarns

A NEW heat setting machine being manufactured by T. W. Riley (Rochdale) Ltd., under licence from John Bright and Bros., Ltd., Rochdale, has been designed for stretching and heat stabalizing thermoplastic yarns, nylon, "Terylene," rayon, etc., also cotton, either in the continuous form or as a spun yarn, the amount of stretch being variable according to the requirements of the various yarns and their construction. Designed to operate at 70 yds./min., the machine will deal with a range of deniers from 1,500–4,000 and units have been constructed for considerably heavier deniers.

Constructional Features

The machine consists of a bank of individually controlled sections not less than ten in number. Each section comprises two frusto conical units electrically heated (one driven, one driver). The shell of the units has five grooves on the conical portion, the increase of the periphery speed of each groove being 3%; the parallel portion also has five grooves. The shells, mounted on shafts incorporating PTFE bearings are heated through the medium of electrical resistance units mounted on silica formers, and the geared and idler units are series wound. (BP. 729,913). The temperature is controlled thermostatically by means of an electronic unit.

The ingoing tension of the yarn is controlled by the use of a disc brake suitably designed to give constant tension, whilst the outgoing tension is controlled by a capstan device driven by a variable speed gear.

The cold stretching zone is suitably mounted between the ingoing tension device and the hot stretching, and consists of a pair of conical pulleys with seven stretching grooves, again with 3% increase in periphery speed per groove. The function of the cold stretching zone is to accommodate yarns of high elongation. By means of suitably mounted clutches, the drive to the heated units and the capstan is such that each section is individually controlled, and the drive to the capstan is by a variable speed gear, common to the whole machine.

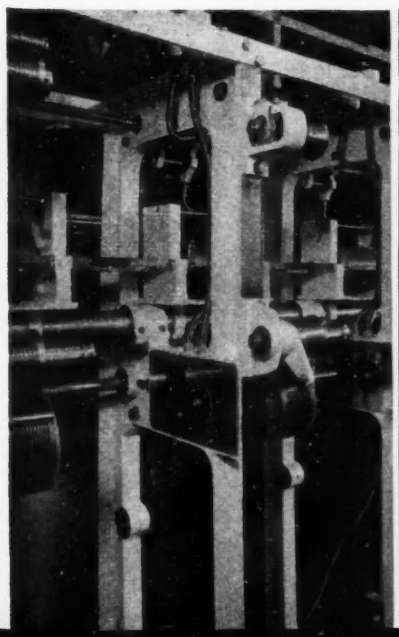
Dipping Machine

Another extremely interesting machine being manufactured by the company also under licence from John Bright and Bros. is a dipping machine for impregnating of cords and yarns with various kinds of dip solutions, usually of aqueous media, and for the production of low stretch cotton cords. Operating at 70 yds./min., the impregnation system in this machine consists of a licking roller mounted in a trough and the amount of pickup is controlled by driving the roller through a small variable speed gear.

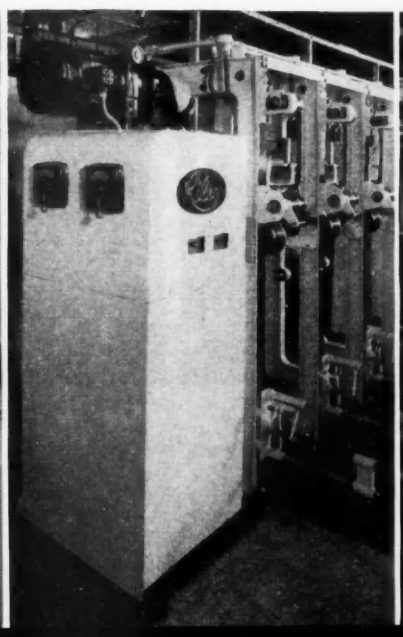
The machine differs from the heat setting machine in that the outgoing tension is obtained by the use of a patented loading device situated on top of the final package. This consists of an L-shaped lever fulcrumed at the base of the two arms, one arm carrying a cylinder mounted on roller bearings and the other carrying a weight. The ratio of arm lengths and the position and size of the weight enables an approximately uniform take-off tension to be maintained as the package diameter and weight increases.

A yarn heater is installed between the cold stretching pulleys, the climbing grooves of which are replaced by a parallel surface. The angle of one pulley to the other is adjusted as to automatically traverse the thread across the heater. The heater place is two-sided, and during its traverse the yarn passes in close proximity to, but without touching the surface of the heater. The resistance type heater element is mounted on a silica former and is controlled either by a voltage regulator or by a Simmerstat.

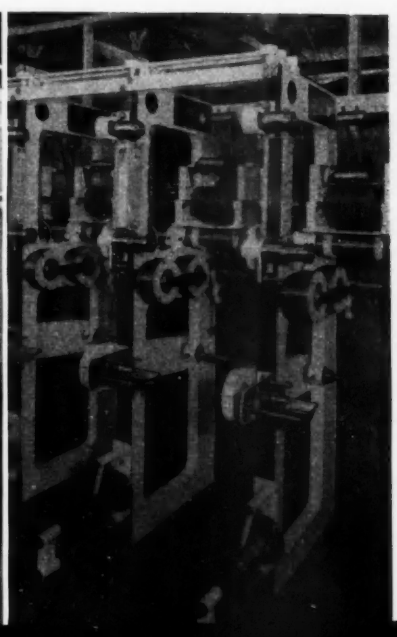
A view of the temperature control and cold stretch zone



A view of the ingoing tension device



The new dipping machine

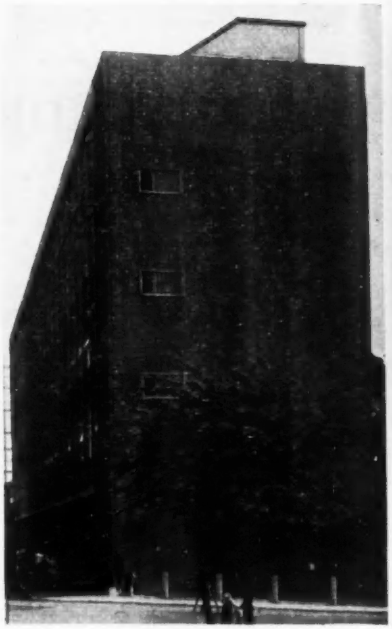


New Textile Department in Blackburn Technical College

THE new textile department of the Municipal Technical College and School of Art, Blackburn, is probably one of the most comprehensive outside those of Manchester and Salford, and the new building is symbolical of the faith Blackburn has in the textile industry of Lancashire, although Ald. R. H. G. Horne (chairman, college governing body), observed at the opening ceremony that the textile industry now was no longer the leading industry of Blackburn.

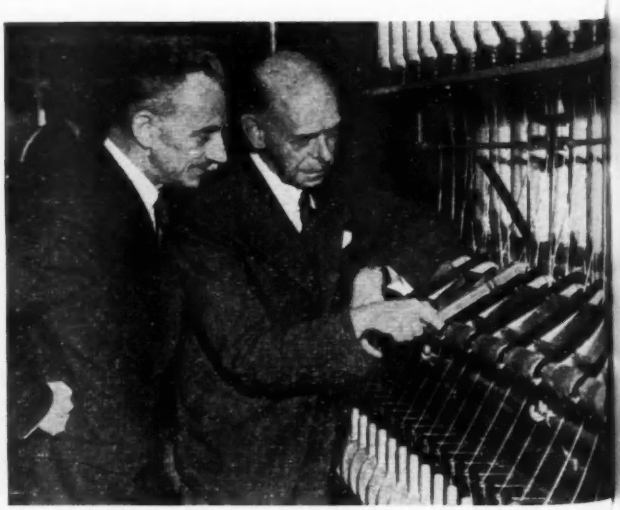
The textile department includes a weaving section which must be one of the most up-to-date in the country. Set in the roof at an angle the windows are dome shaped and fluorescent lighting is fitted to give beautiful even illumination when required. Jacquard machines are all at one end of the shed and an overhead gantry arrangement permits ease of inspection, demonstration and maintenance. In all 32 looms are installed in this department including models by British Northrop Ltd., Blackburn (one, the new topless design), Butterworth and Dickinson Ltd., William Dickinson and Sons Ltd., George Hattersley and Sons Ltd., Henry Livesey Ltd., J. Pilling and Sons Ltd., W. B. White and Sons Ltd., and Willan and Mills Ltd., Looms of Continental manufacture are also featured and, arranged in conjunction with the weaving room, is a fitting section in which students are provided with excellent facilities for obtaining first hand knowledge of loom mechanism and maintenance. Lathes and other equipment give students the opportunity to make smaller parts for themselves in connection with loom maintenance.

The section concerned mainly with carding, spinning and yarn preparation is another fine example of careful planning and modern equipment. There is a complete range of preparatory and spinning machinery here from opening and blowing-room equipment, carding, lapping and combing machines, speedframes and ring spinning machinery. Platt Bros., Oldham, have fitted out a fine, representative selection of machines, as also have Howard and Bullough Ltd., Accrington. Platt's MS2 high-draft speedframe is installed, and there is also a Platt's weft ringframe spinning direct on Northrop pirns fitted with the Ashton bunching motion. Arundel Coulthard have a fancy doubler and there is also a good selection of pirn winding machinery, including the Muschamp SS100, the Holt Model K machine, the "Leesona" winder, and the "Hacoba," the Scharer and the Schweiter machines. Other very notable features include a textile physics laboratory and also a textile chemistry laboratory, where a good range of equipment is available, in-

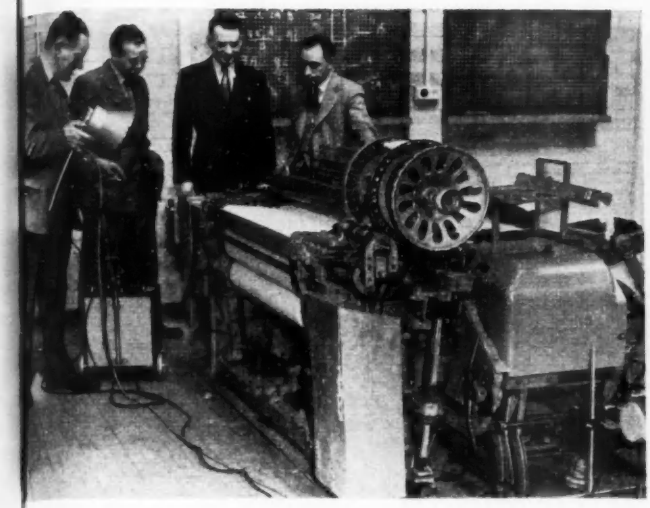


Exterior view of the new department

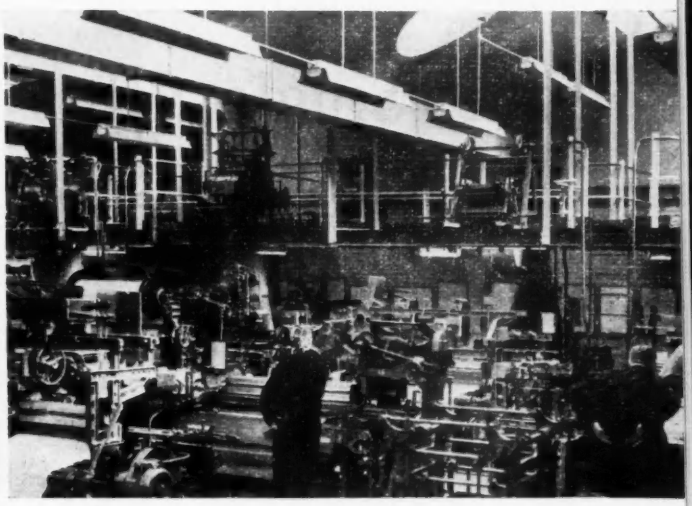
Seen examining a Platt's drawframe are (l. to r.) Mr. H. Sneyd, A.T.I. (Courtaulds Ltd.), Mr. D. L. King, B.Sc., Tech. (head, Textile Dept.), and Mr. A. Pomfret (James Stuttard and Sons Ltd.)



Looking at a Platt's high draft ring-frame (left) Mr. E. Marsland (Technical Director, Platt Bros. (Sales) Ltd.) and Mr. W. A. Hunter (T.M.M. Research Ltd.)



Mr. J. S. Dimelor is demonstrating the Dawe portable stroboscope to Messrs. T. E. Mallinson, A. Coggins and W. A. Brook (all of Herbert Parkinson's, Darwen)



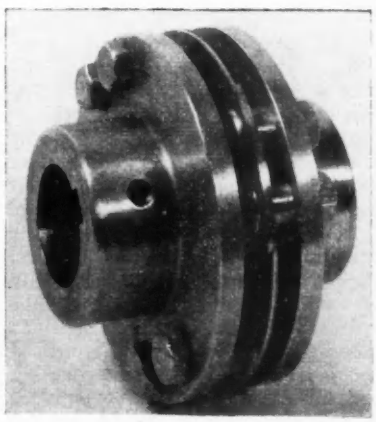
A view of the overhead gantry in the weaving shed. This enables students to work on jacquard equipment

cluding a Smith jig dyeing machine, a Bibby laboratory winch dyeing machine, a Unicam spectophotometer and Griffin oven, also a Cambridge pH indicator.

The knitting section includes Grisvald hand-operated plain or rib half-hose machines, a Chell seamless hose machine and also braiding machines and a machine—an eight-feed circular model by Geo. Blackburn and Sons Ltd., as well as a Komet machine. The testing department has a splendid range of equipment, including the Uster automatic single thread strength tester and the automatic cotton stapler, a Denison cloth testing machine, a Cambridge extensiometer and other equipment. One extremely interesting instrument in this laboratory is the Gaydon sliver roving irregularity tester which works in conjunction with an electronic computer.

The head of the textile department is Mr. D. L. King, B.Sc. (Tech.), A.M.I.Mech.E., A.T.I., and Dr. E. Tyler, D.Sc., A.M.I.E.E., A.F.R.Ae.S. (principal, Blackburn Municipal Technical College and School of Art), at the opening ceremony urged students to take full advantage of the many opportunities offered at the college.

New All-Metal Coupling



A NEW flexible power transmission coupling of considerable interest to all sections of industry was introduced for the first time by Metaducts Ltd., Catherine Wheel Road, Brentford, at the recent Chemical and Petroleum Engineering Exhibition at Olympia. This latest addition to the "Metastream" range of all-metal couplings, designated the Series CN, is available in sizes which at the moment are limited to a maximum bore size of 1¾ in. and maximum h.p./r.p.m. rating of 0·010.

The transmission membranes can be removed from the coupling without disturbing the driving or driven units and can be replaced for a few shillings.

Pointing out that these couplings are completely free from corrosion, require no lubrication and employ no rubber bushes, springs, gears or chains, the company state they are unaffected by climatic conditions or operating temperatures and are available in single and double bank types.

Bradford Conditioning House

Bradford's wool textile industry had a busier month than might have been expected in May. Figures for the Conditioning House were better than for any month since July last year. More than 10,760,000 lb. of material, nearly all wool, passed through in May and only three times since the war has this monthly figure been exceeded. It can be compared with the return of 6,600,000 lb. for May 1952, during the recession. This result was achieved despite the loss of two working days for Whitsuntide. Exports of wool tops are being maintained, due partly to sales to China. The number of tests made in May this year was 27,384, a figure which has been surpassed only six times since the war. For the five months to the end of May this year the weight of material passing through the House totalled 48,700,000 lb., compared with 52,600,000 lb. during the corresponding part of last year.

The Single Ring Doffer Condenser

This type of condenser is at its best on Saxony and fine crossbred batches but the restriction in rubbing power imposed by a single pair of rubbers detracts a good turn-off as the stroke must be kept short to avoid rolling the slubbings into each other

By J. A. B. MITCHELL*

THE simplest of all woollen card condensers is the single ring doffer, single stripper, shown in Figs. 1 and 2 but in many carding plants it is being gradually displaced by the tape form though for some materials and certain types of yarn it is still preferred. This condenser turns off 50 to 64 slubbings all of which are formed on one doffer, removed and rubbed simultaneously by the same stripping and rubbing motions. The doffer D (30 to 36 ins. dia.) is fitted with rings or fillets of card wire which may vary in width from $\frac{11}{16}$ to $\frac{15}{16}$ in., these being separated from each other by space bands $\frac{1}{4}$ to $\frac{7}{16}$ in. wide. The two outside rings are purposely made wider in order to carry material from the edges of the swift so that the slubbings selected for spinning are taken from an area away from the edges of this roller. These marginal slubbings, usually thicker than the rest, are run to waste.

The teeth of the ring doffer make normal "point-to-point" working contact with those of the last swift A, but only the rings of wire teeth can snatch and hold material carried by the swift so that the web of fibres on the latter is divided into a series of narrow endless strips of fibres more or less detached from one another by the intervention of the space bands. Stripper B runs "back to back" with the doffer teeth and peels off the narrow fibrous ribbons each of which passes through a V-shaped groove in the metal divider C before entering the nip of the rubbers R and R^1. A second stripper B^1 ensures that the fibres do not travel round with B to which it is very closely set.

The two rubbers reciprocate over one another as they revolve so that each endless band of fibres is rubbed or rolled into a round compact but twistless slubbing ready for spinning. On emerging from the rubbers the odd numbered ones pass to spool 1 on drum E, while the even numbers move downward then under guide roller G to spool 2 on E^1. Each slubbing passes through a division in the heck or raddle H or H^1 which reciprocates over a distance of 2 to $2\frac{1}{2}$ ins. fairly rapidly so as to spread the 25-32 ends and build them as "cheeses" side by side between the flanges of the spool. On some machines the top slubbings double back and proceed round a companion roller like G before being wound on to the spool on E. This helps to separate the odd from the even slubbings as soon as they clear the rubbers and so combat the tendency of neighbouring ends to lick and tear due to stray fibres connecting them, a trouble experienced on new wool blends of cheviot quality.

When the finisher card is served by any feed other than the ball and bank, provision must be made for dealing with the narrow belts of fibres left on the swift by the space bands at each turn of the ring doffer. This is achieved by one of the following methods:—

(1) By causing the ring doffer to reciprocate slowly over a short distance while revolving.

(2) By making the second last worker traverse slowly 1 in. or so across the swift at each turn.

From a mechanical point of view, the latter method is the simpler, while in the case of the traversing doffer the rings must be arranged at a slight angle so that they always lead the slubbings to the centre of the groove on the divider. The latter is the key roller because its shape, position and setting are factors which determine the success or otherwise of this condenser. The width of the groove must coincide with the pitch of ring plus space and it is vital that the divider be aligned with the doffer so that a ridge on C is directly opposite the centre of the space-band

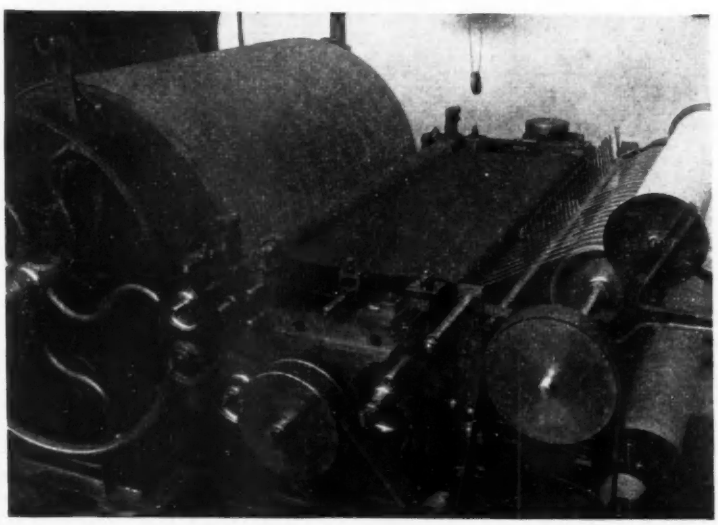


Fig. 1. General view of the single ring doffer condenser

* *Scottish Woollen Technical College, Galashiels.*

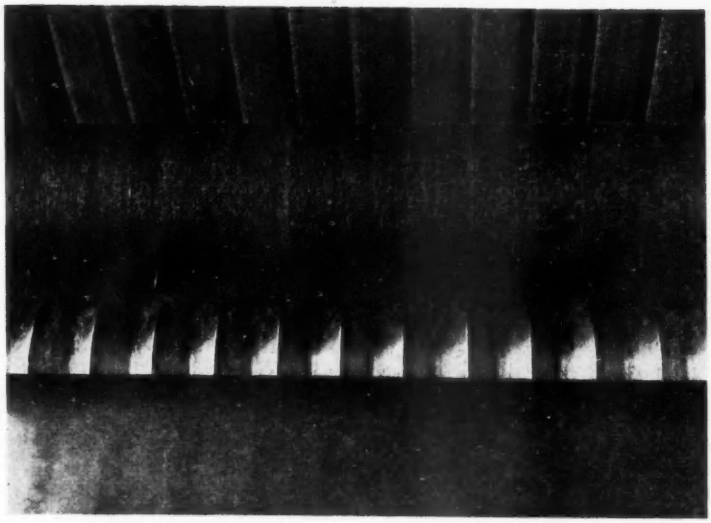


Fig. 1A. Close-up show ing the importance of aligning the divider ridges directly opposite the centres of the space-bands

as shown in the close-up (Fig. 1A) as well as in Fig. 2a in which the parts are drawn as the swift would view them.

As is customary on all condensers employing a roller-stripping motion, the teeth of stripper B are set to mesh slightly with those of the doffer rings. The companion stripper B^1 is often set to touch the card of B very lightly and in this way the points of the teeth on all three rollers are kept clean and sharp. Except when the carder is served by ball and bank feed the last swift is generally covered with an unbroken mass of criss-cross fibres so that the splitting of the web into narrow slivers at the doffer/swift contact is only partially successful unless the space bands are $\frac{3}{8}$ or $\frac{7}{16}$ in. wide, or when the material consists of short fibres.

In blends of new wool, especially crossbred qualities, the conical ridges are required to sever all fibres bridging the gaps by ploughing up between adjacent slivers and even then a clear cut is sometimes impossible. With such materials the speed of intake by the rubbers should be adjusted to keep the fibrous ribbons under reasonable tension, while the divider should be set as high as possible so as to force the slivers well down into the "V" grooves. The single ring doffer condenser is more successful and less troublesome on fine counts and on saxony qualities, i.e. waste blends, new wools of 58s quality and upwards, botany noils and mixtures of wool and/or noil with cotton in all of which the fibres are fairly short and fine. The combined width of ring and space will determine the permissible number of ends from a given width of card, or conversely, the limits of ring and space will be set by the number of slubbings taken off the condenser. The width of the ring governs the range of counts workable with ease, while the breadth of the space largely influences the fibre length of the material which can be processed successfully.

Clothing Methods

There are two methods of clothing the doffer, viz.—

(1) By first covering it with fillet card and then cutting out wires close to the canvas so as to form annular grooves at intervals across the roller. The spaces are now filled in with leather strips, formerly with lead. This is known as a "cut-out" doffer.

(2) With leather rings filled with card wires, these rings being supplied in a size to fit the circumference of the doffer. Each ring, preceded by a narrow blank fillet, is run on to the roller from one end and guided into position alongside the previous one.

Recently there has been a revival of interest in the virtues of the cut-out doffer arising from a suspicion that the use of individual rings is one of the main causes of much of the variation in counts of the slubbings. Naturally one would expect—other things being equal, of course—that all ends delivered from a single ring doffer would be alike or very nearly alike in size or weight per unit length but, in practice, this is seldom the case.

Chart A in Fig. 3 shows the variation in counts across the 48 slubbings in which the mean of the whole series is 18 cut Gala or 14s Y.S.W. Notice that the maximum deviation above and below the mean is always under 1 count and thus the range of variation works out at 10% while the standard

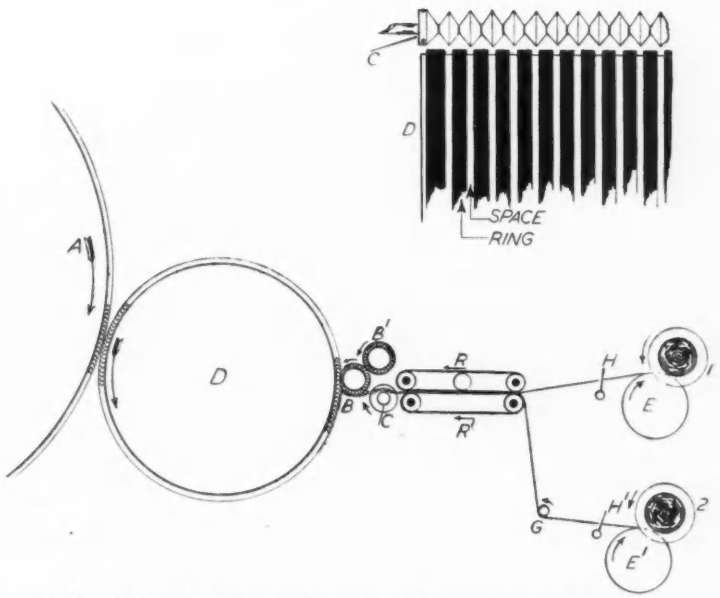


Fig. 2 and (above, right) Fig. 2A. Sketch showing swift, doffer, strippers, rubbers and other details of the single ring doffer condenser

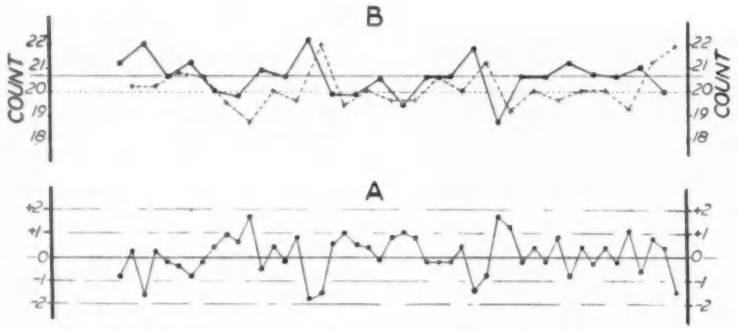


Fig. 3(A) Variation in counts across the 48 slubbings
(B) In analysing the results, the odd numbers have been separated from the even ones and their count plotted independently

deviation is 0·47 and the C. of V. is 2·6%. In analysing the results the odd numbers have been separated from the even ones and their count plotted independently in Chart B. The mean count of the top slubbings is the same as the figure for the 24 ends on the bottom bobbin.

These results are typical of the single doffer condenser at its best, although closer study of both charts in Fig. 3 gives one the impression that the count variation is rather more pronounced towards the right-hand side than is the case among the ends on the left-hand side, while the readings for slubbings 1 to 10 will be seen to lie above the mean. Stated another way the charts reveal that several of the slubbings produced at the right side of the condenser are slightly lighter in count than the majority, although the drift is not really very serious. Incidentally, when checking on possible causes it was discovered that the ring doffer/swift setting was very slightly easier on the right side of the machine which could account for this feature in the results.

Independent of the occurrence of light side ends (a fault encountered on other types of condenser) which are frequently due to causes outside the doffer, there is sometimes a slight difference in the mean count of top and bottom slubbings. An example of this is provided by another series of readings taken from the same condenser some years ago. The results are plotted at B in Fig. 4 so as to show the counts of the odd and the even numbered ends separately. The mean of the top bobbin slubbings is 20·7 cut and for these on the bottom one the mean is 20·0 cut. The C. of V. for the whole series works out at 4·1%.

Inspection of chart B reveals that in general, the readings relating to the top bobbin slubbings lie above the mean (20·4 cut) for the series of 48. The difference in mean count, whichever bobbin is the heavier, is most likely due to different winding tension between the two sets of ends while each set passes by a different route to its own bobbin. Of course the chance existence of one or two decidedly light (or heavy) ends in either top or bottom series could upset the equilibrium and produce the same discrepancy in the average counts of the slubbings on the two bobbins.

Limitations

Two features of this form of condenser impose limitations on the materials it can tackle and on its output potential. For example, the proximity of the ends to one another while in the rubbers severely restricts the fibre length and counts of yarn it can treat without difficulty, especially in lively new wool stock. Waste blends, comprising short fine fibres, do not cause undue difficulties, but in the better class trade the single ring doffer, single stripper condenser is best on saxony and fine crossbred batches.

It is not so well suited, however, to the coarser and longer fibred materials in which difficulty is encountered in separating the sliver bands because of the tendency for fibres to bridge the gap between adjacent ends during rubbing. The outcome of this is split or torn ends through these connecting fibres detaching themselves from one sliver in following the other by another route to the bobbin. Apart from "ends down" in carding many twitty slubbings are made at this stage of the process.

The second feature in the construction of the single ring doffer creates a "bottleneck" to output from the card set. The spaces account for roughly 25% to 30% of the doffer width so that only about 70% to 75% wire surface is provided to meet a swift fully covered with teeth. In effect this means that for every 100 units weight of fibre offered by the swift, or likely to be carried away by a fully-clothed doffer, the ring doffer can only take 70% to 75% of its capacity at any time so that output from the card set is slowed down in consequence. Furthermore, the restriction in rubbing power imposed by a single pair of rubbers detracts from a good turn-off since the stroke of the rubbers must be kept short in order to avoid rolling the slubbings into each other. On the older patterns of condenser, with limited speed of motion-shaft, the ring doffer has to be slowed down on crossbred qualities to give the rubbers time to rub the slubbings properly.

(To be continued)

NOTES ON WATER POLLUTION—No. 1. D.S.I.R., Water Pollution Research Laboratory, Elder Way, Stevenage, Herts. This leaflet is the first of a quarterly series which will deal with different aspects of water pollution and its control. The series is intended primarily for industry whose interest in problems of pollution has greatly increased in the past few years. Further information can be obtained by writing to the director, Water Pollution Research Laboratory.

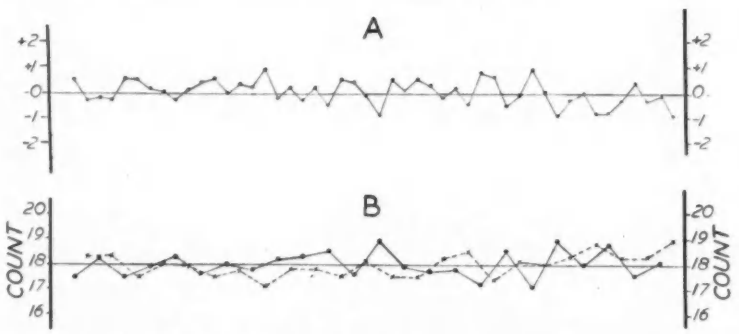


Fig. 4. Another series of readings from the same condenser some years ago

Warp Knitting of Flat (Unthrown) Nylon Yarn

SPECIALLY prepared warp knitting yarn is supplied by B.N.S. on 1¼ ins. dia. metal tubes using a double taper build. The yarn is already treated and prepared in such a way that it is not necessary to redraw, or apply extra oils, lubricants or other anti-static finishes. Packages, therefore, can be placed straight on the warping creel. The packages are prepared with a new and advantageous type of wind which has a different appearance from that previously employed on similar yarns.

Creels and Creeling

In view of the low number of turns in this yarn, it is advisable to take great care when the packages are removed from the supply containers and unwrapped to minimise the chances of disturbing or breaking filaments. Handling should be reduced to the minimum and packages should be unwrapped in front of the creel and placed immediately on the appropriate package holder.

Ensure that the creel is in perfect condition, free of rough or cracked guide eyes and with the centre of the yarn packages directly in line with the first guide eye. All guide eyes and contact points on the creel should be of a ceramic type. The distance between the guide eye and the nose of the package should be approximately 7 ins. In this way a large balloon of yarn is assured and consequently a lower tension difference between the upper and lower ends of the tube will result. The tension device should be of the lightweight disc type so that the individual filaments will not be displaced during the yarn take off. This precaution enables a low yarn tension to be obtained during warping, an important consideration since the flat yarn packs more closely than thrown yarn on the beam. In order to avoid the catching of filaments on any roughened surfaces of the tube, it is advisable to use take-off caps. The standard celluloid cap should not be used since the spinning finish has an adverse effect on the cap surface. It is recommended that a special rigid P.V.C. cap should be used, similar to the type which is produced by Cascelloid Ltd. of Leicester and known under B.N.S. Drawing No. 41/3936.

Warping

The yarn tension must not exceed 0·23 grams/den. at the winding on point, and preferably 0·2 grams. Checking should be done on individual yarn ends. It is recommended that the warping sheet should be arranged for easy observation of yarn quality so that any yarn faults can be removed. It is advisable to warp at 100 yds./min. until the warpers become conversant with the process. The placing of a suitable blackboard or length of green billiard cloth underneath the warp sheet in front of the final reed of the mill is an advantage for observing any yarn defects. In order to check that all yarn ends have approximately the same tension, it is recommended that the winding up device should be stopped periodically and turned back slightly, particularly when a new warp section is started, to see whether all yarn ends sag equally. Should some tend to come down farther than others, a check should be made on the corresponding tension device to see whether it is operating correctly, and that no accumulation of dirt and dust keeps the disc from operating efficiently.

Using such a low yarn tension the droppers of the stop motion tend not to be held up and thus persistently stop the warping machine: to overcome this without increasing the yarn tension to a great extent, a matt chromium plated bar, approximately ¼–⅜ in. dia., should be fitted just in front of the droppers. This bar will deflect the yarn and suitably support the droppers. The above suggestions apply to direct and indirect warping. Occasionally in conditions of very low humidity, static electricity might form during warping. In the majority of cases the amount will be so small that it is not found to be troublesome. Electric anti-static devices if placed between the condenser and the final reed will eliminate the formation of such charges and prevent the yarn ends from repelling each other at the point of winding. A great help is keeping the warping area at a controlled temperature of 62°–67°F. and 65°–75% R.H.

Knitting

The warps made from the flat yarn will be denser and consequently harder than warps made from thrown yarns. This, however, will not be detrimental provided the warping tension has not exceeded the recommended values. (Shore hardness 65–75 is ideal.) Experience has shown that fabric knitted to a good quality construction gives higher knitting efficiencies than fabric knitted to a lower quality, for instance 60 courses/in. in the grey using 30 den. yarn has given good results. (The usual knitting speed need not be altered.) Sometimes it takes a few hours before a knitting machine can be speeded up to the maximum. It is, therefore, advisable to knit at 800–900 courses/min. on the high speed knitting machines for the first 2–3 hours and then increase to top speed.

A few points should be particularly noted:—

When knitting, the yarn should be passed through a reed on the warp knitting machine fitted in front of the yarn tension bars in order to ensure that the yarn is not twisted prior to reaching the knitting elements. One should ensure that all the filaments comprising one yarn end are passing through the corresponding opening in the reed and are threaded through one guide. It is advisable to knit a short length of fabric after threading the first guide bar as the following defects, if present, come to light immediately.

(1) Yarn breaks at the reed, caused by leaving out individual filaments.

(2) Yarn streaks of thick and thin longitudinal stripes in the fabric caused by one or more filaments of one thread being passed through an adjacent guide or by incorrect threading.

If a satisfactory fabric is then obtained, the threading of the second guide bar can commence.

In view of the yarn forming a ribbon at all contact points, a greater area of contact is created and a high yarn friction results. This, in general, will mean that a slightly tighter fabric will come off the machine. Knocking over of the loops from the needles is slightly more difficult, and, therefore, it is advisable to assist this operation by making a readjustment of the sinker bar. The sinkers should be brought slightly more forward, not only to assist the actual clearing of the loops but also to ensure that this operation is carried out uniformly, as very often the needles get slightly more deflected by the fabric take-off than when knitting thrown yarns. This needle deflection tends to be more evident on bearded needle machines, where a readjustment of the presser is often advisable to ensure complete closing of the beard and no loading of individual needles by the filaments.

Cut guide eyes and other faulty knitting elements on the machine will soon make themselves noticed. A slightly higher than normal setting of the guide eyes might be an advantage, allowing more room between the yarn guides and needles. It is, of course, most essential that the warps are kept fairly tight and under constant control. No looseness in the yarn sheet should be permitted. This does not mean that one must knit fabric with a greater number of courses per inch. Should a slacker quality be desired, it is advisable to draw a large loop by either dropping the needle bar or raising the sinker bar, but not by feeding the yarn in slacker.

It has been found that on high speed warp knitting machines, particularly the F.N.F. type, reinforcement of the yarn tension bars is advisable. This can be achieved by shortening the tension bar springs, which means setting the reed and the bars themselves farther back to the fixing point or inserting more supporting springs. The reason for this is that with the high speed of knitting, the deflection of the yarn tension bar will come out of phase at cycles and so could give a slack yarn sheet when the guide bars swing through the needles. The later F.N.F. machines have more or less solid yarn tension bars which obviate this symptom. The take-off roller should be covered by fine emery cloth, cork or dimpled rubber, as a rough covering material will snag and damage the fabric. Although a number of minor alterations in techniques as outlined above are of great help in the warping and knitting of flat (unthrown) yarn it cannot be over emphasised that the biggest single factor in achieving satisfactory results is constant attention to detail as regards the condition and adjustment of machinery.

New Standard Range of Ceramic Thread Guides

FOLLOWING the recent announcement that a new range of "Sintox" ceramic thread guides were available from Lodge Plugs Ltd., Rugby, information is now given why these standard guides were decided upon and how they can be fitted to existing machinery. This range has been made available by mass-producing a specially selected number of shapes by improved production methods and new manufacturing techniques. The result has been greatly reduced prices and delivery ex-stock. Previously guides were expensive when compared with porcelain and were recommended only where *very* severe wear problems were encountered; because of the price, usually only small quantities were ordered and these had to be made specially, delivery being about eight weeks. It was because of this that a standard range was decided upon.

Throughout the industry vast numbers of different thread guides are in use, some only differing from each other by a few thousandths of an inch and, whilst most will operate satisfactorily on natural fibres they are often unsuitable for the latest man-made fibres. At first, Lodge Plugs found it necessary to determine the most common applications for guides and then find the most common fitting sizes so that a fairly comprehensive range of guides could be built up. This was done, and the present range, it is stated, should now cover the majority of guides in present use, though the company will still make guides to customers' requirements.

Although the guides in the standard range cater for most of the guide holders in existence, there are some holders and "holes" which these guides will not fit. When this arises slight modifications to holders are recommended, either by reaming a hole to take an "oversize" eyelet, fitting appropriate size metal "spade holders" to take slotted plate guides and hooked trap guides, or "packing" oversize roller bores or undersize eyelets with Araldite cold setting cement. This procedure may sound elaborate but the makers point out that as "Sintox" guides do not wear then it is more economical to make the change to alumina ceramics than to replace other guides, even if the frequency of this replacement is only every three or four years. Again, a machine may be using a very complex guide where a much simpler shape would do a better job.

Apart from the smooth finish and high standard of inspection, alumina ceramic guides are made to close tolerances, usually in the region of ± ·008 in. or if necessary certain shapes can be ground to ± ·005 in. This, of course, means that guide replacement is made easier, they will all fit, and tensioning troubles are kept to a minimum because every guide is exactly the same size and has the same standard of finish.

Material quality control and rigid standards of inspection ensure that every guide has the same hardness, strength, weight, and co-efficient of friction. In its normal finish the amount of "drag" on a "Sintox" guide is very small indeed and minimum tension is built up. However, if high tension is required then this can be obtained by polishing "Sintox" with diamond paste or grinding wheels. The weight of this material is less than half that of steel so it can be used where reduced weight or small size are of prime importance. Its strength is four times that of porcelain. Even thread guides must keep pace with the rapid growth and transformation of this modern textile world. (Sole selling agents in the U.K. for "Sintox" guides are Crabtree Textile Accessories Ltd., Colne, Lancs.)

Book Review

THE FULL-FASHIONED HOSIERY INDUSTRY IN THE U.S.A. By Dr. J. D. De Haan. Mouton and Co., The Hague, Holland. 1957. pp. 188.

This very acceptable and interesting monograph describes first the history of the full-fashioned stocking industry from its early beginning in 1589, when the Rev. William Lee of Nottingham constructed a knitting frame on which 12-gauge woollen stockings could be knitted, to the foundation of the first American hosiery firm in Germantown, Pa., in 1689. Before 1850 hosiery was chiefly the product of the knitting needle plied by hand, and in the second half of the 19th century the transfer of hosiery manufacture from the household into the factory took place. From then onwards the number of mills increased steadily. At first full-fashioned hosiery was mainly a sideline of mills producing circular stockings and full-fashioned stockings were looked upon as a foreign product; circular knit hosiery in those days was a much cheaper proposition. Circular stockings began to feel the first real competition from the full-fashioned product around 1907. American-made machines had become available, and in 1955 there were 556 mills producing 47·3 million dozen pairs of full-fashioned hosiery compared with 12·7 million dozen pairs seamless stockings. The victory of the full-fashioned stocking over the circular type was accompanied by a changeover in the raw materials. This is described in Chapter 2 of the book which is divided into the wool period (from the beginning of hosiery until about 1900), cotton period (1900-1919), silk period (1919-1941), rayon period (1941-1946), nylon period (1940-1942, 1945-present), and it relates how the hosiery industry in U.S.A. coped with the different raw materials.

Chapter 3 deals with the technical organisation for the production of full-fashioned hosiery and gives a brief summary of the production processes. A description of the development of the knitting machinery follows the structure of the hosiery industry in general and the American hosiery industry in particular. Other chapters describe the various types of mills, marketing and selling methods, the development of certain brands in the industry. There is also a survey of (*a*) the location of the full-fashioned industry in U.S.A., (*b*) about the influence of the labour factor on the shift in location of the industry, (*c*) capital investment required for starting an average hosiery mill, (*d*) taxation level in the various American States and (*e*) the wage-differential existing between the Northern and Southern States. The influence of the supply of water on the choice of location, the required energy resources, price factors and calculation are also discussed. The problem of over-production and under-consumption is analysed, leading to the last chapter on the future of the American full-fashioned hosiery industry. The introduction of nylon yarn gave an impetus to the circular hosiery industry, which increased from 12% in 1949 to 21% in 1956 of the total production of stockings. The author predicts that if the two products, full-fashioned and circular become technically more or less alike the fashion determines which type will be worn.

B.S.

Worsted and Woollen Blend Cloths

Design, colour selection, weave and finish are all features of the patterns reproduced approximately full size, linear, on the facing page. The cloths shown are seven from the ranges of high quality dress, suiting, etc., fabrics manufactured by Walter Gledhill and Sons Ltd., Bridge Mills, Holmfirth, near Huddersfield. Brief details are as follows:—

(1) Beautifully combined colour and weave in a woollen twist cloth of 15/17 ozs. composed of 50% wool and 50% "Acrilan."

(2) Novel design in a modern sports jacket cloth in fawn, black and white. Weighing 14 ozs., it is 50% wool and 50% "Fibro."

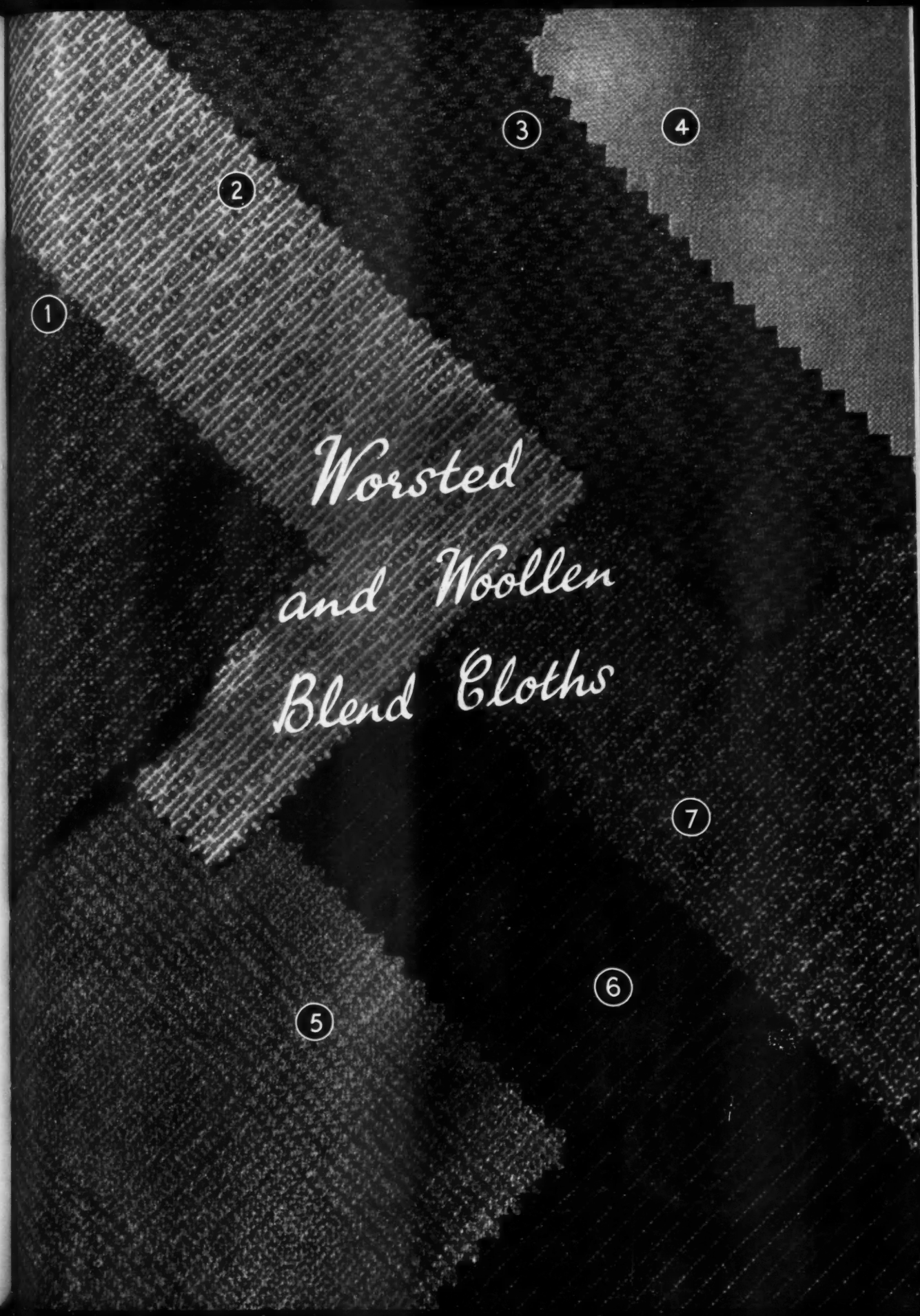
(3) A very fine "Fibro" and wool mixture cloth of 15 ozs. expressly designed for two-piece suits and distinctive sports jackets.

(4) Pale lavender shade woollen skirting cloth of 50% wool and 50% "Acrilan," weighing 10 - 11 ozs.

(5) A quiet dignified blended worsted cloth in which the very faint checking is enhanced by lustrous fine decorative yarns. It is 50% wool and 50% "Fibro" and is 15 ozs.

(6) A standard suiting cloth—black with fine hair-line stripe—of 13 - 14 ozs. This is 50% wool and 50% cotton.

(7) Another woollen twist cloth which shows good taste in colour combination. Composed of 50% wool and 50% "Acrilan," it is 16 - 17 ozs.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Worsted
and Woollen
Blend Cloths
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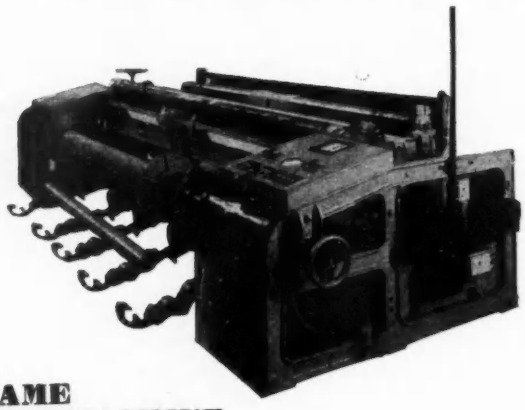
Lockheed Hydraulics enable constant pressure to be applied to beam rollers, from nothing to 1,000 lbs. per square inch, each side controlled independently. Constant Peripheral Beaming Speed throughout entire range of beam, from 6" diam. barrel to 36" diam. flange, at three different speeds. Totally enclosed oil immersed Constant Speed H-Gear Unit. Warp Length guaranteed. Machine automatically cuts out at any pre-set yardage for any number of beams, until re-set.



Tube frame threaded with the spool in its spring holders; eliminates four operations (patents pending). Needles are brought forward by simple foot operated switch, leaving operatives' hands free to attend to interrupted ends and return to thread by the same operation. Tube frames can be threaded as fast as removed from the chain, thus facilitating immediate return to their last position in the chain. All needles have rounded crochet hook ends, preventing yarn damage and enabling smoother threading. All spool end strive difficulties overcome enabling, 100% threading even if strive is as much as 1" by our new full length comb. By fitting side supports the standard 4/4 machine can thread 2/4 to 16/4 Tube frames, or a machine can be supplied 12/4 in width. Tube Frame automatically clamped eliminating still a further hand operation.

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Variations of Composition in Fibre Blends*

A survey of composition of some cotton/"Fibro" blends has shown the differences in composition that can be expected between nominally identical yarns under normally satisfactory spinning conditions

By J. E. FORD, T. MURPHY and W. A. RICHARDSON†

A COMMON defect in cloth woven from blended yarns is a difference in shade between cops of weft lying side by side in the cloth, arising from a difference in average composition between the cops. It is, of course, unreasonable to expect that the average composition of all cops from one spinning should be identical in composition, and two questions then arise: What is the greatest difference in average composition between adjacent cops that can occur without the development of a bar when the component fibres are dyed to different shades? and secondly, What difference in composition can be expected between nominally identical cops spun under normally satisfactory spinning conditions?

This paper describes an experiment made with blends of known composition to provide an answer to the first of these questions, and, as a partial answer to the second, gives the results of a survey of the composition of yarns spun at various mills. The first investigation shows that, when the blended fibres differ widely in colour, the tolerance in average composition between successive pirns is not more than 2%‡ and may be appreciably less, if visible bars are to be avoided. On the other hand, when the difference in colour between the components is comparatively small, the tolerance is much greater. An example is a blend of cotton and matt, uncoloured viscose rayon, when the fabric is piece-dyed. In such a blend, a well-defined bar does not appear until the difference in composition between adjacent pirn-widths is about 5%.

The survey of blend composition at different mills is incomplete and is confined to blends of cotton and uncoloured viscose rayon in a single nominal proportion. The results have shown that in any one quality the compositions of most of the individual leas differ from the average composition of the whole yarn by less than 3%. There are, however, real differences from one quality to another, and in some there are no leas with an average composition differing from the average of the whole by more than 2%. The number of bars due to composition differences occurring when these yarns are woven as weft into cloth which is afterwards piece-dyed is quite negligible; if, however, the rayon component had been spun-dyed, and the cotton left undyed, several of the qualities would have produced very barry cloths.

The nominal composition of the yarns in the survey was 66·7% cotton, 33·3% rayon. The mean composition differed from the nominal in every quality; in 4 of the 11 qualities the cotton content was between 62 and 63%. Observations at one mill at weekly intervals over an extended period showed that, although the actual average composition of the yarn being spun on any one occasion differed significantly from the nominal, no trend could be seen in the changes of composition from week to week during the period, and the variations in the weekly means were much less than those between different packages sampled on the same occasion.

Effect of Composition Differences on Shade Differences

If the two components of a blend were coloured identically, mixtures of different composition would not differ in shade, though they might differ in appearance because of differences in fibre denier or in the hairiness, lustre, or some other feature of the yarn surface. In order to minimize differences not due directly to different proportions of the coloured components, most of the experiments have

* *Abstract of a paper given at the annual conference of the Textile Institute at Edinburgh.*

† *British Cotton Industry Research Association, Didsbury, Manchester.*

‡ *By a difference of composition of 2% is meant a difference in the proportion of either component. For example* 50 : 50 *differs by* 2% *from* 52 : 48.

(l. to r.) C. Brooks, B.Sc. (Leeds University), R. S. C. Fletcher, B.A. (Carpet Trades Ltd., Kidderminster); W. A. Richardson, M.Sc. (B.C.I.R.A.) and Professor J. B. Speakman, D.Sc., F.R.I.C. (Leeds University

been made with binary blends of fibres of the same chemical type, denier and staple length, but differing in colour; for example, from 1½-den., 1 7/16-in., matt and black (spun-dyed) "Fibro"; pairs of viscose rayon fibres of other colours have also been used. With such blends, it is reasonable to suppose that any shade differences between yarns are the result of the difference in colour between the proportions of the constituent fibres. In addition to the all-viscose rayon yarns, blends of 1½-den. "Fibro" with 3-den. cellulose acetate staple and cotton, respectively, have been spun.

The experimental yarns were spun on a miniature spinning plant from total weights of mixing of from 30 to 60 grammes. Most of the yarns were of 30s count (19·7 tex), with a twist factor of 3, though a number were spun at a count of 12s (49·2 tex). The required quantities of the two components were carefully weighed and spread on the card lattice in superimposed layers, arranged as evenly as possible by hand. The mixture was passed twice through the card and three times through the drawframe, making an 0·3-hank (approx.) sliver. The spinnings were made direct from the sliver on the spinning frame, with drafts of about 100 for the 30s yarn and about 40 for the 12s. The composition of each yarn was known from the weights of the two fibres taken for the mixing, since there was very little waste, and was checked by counting the numbers of both fibres at 60 places chosen at random, but fairly widely spaced along the yarn. The average composition by number of fibres was found to agree very closely with the reputed composition by weight when due allowance was made for the slight difference in fibre denier that was sometimes found between fibres of the same nominal denier. Some data for yarns containing from 46 to 50% of white fibres are presented in Table 1.

Table 1

Reputed composition, white fibres by weight, %	46	47	48	49	50
Determined composition, white fibres by number, %	45·0	46·2	46·8	48·0	48·9

The white fibre was, in fact, about 2% coarser than the black, and when the proportions of white fibre by number are multiplied by the factor 1·02, they agree satisfactorily with the reputed composition by weight.

In the main experiment, five groups of yarns were spun, with fibre ratios, white : black, about 15 : 85, 33 : 67, 50 : 50, 67 : 33 and 85 : 15. Each group consisted of several yarns with compositions differing in small steps. The yarns given in Table 1 are one such group; in some of the others the steps were less than 1%. The yarns were examined on the bobbins, as wrappings, and as the weft of two cloths, a sateen and a twill, each with an undyed cotton warp yarn. These cloth constructions had the advantage that different proportions of weft were visible on the two faces, so that it was possible to make comparisons when 80, 60, 40 or 20% of the cloth surface was covered by the weft yarn.

The weaving was so arranged that pirns of yarns differing in composition to any selected degree were woven side by side. For example, in the group of Table 1, four 1% steps are possible (46–47, 47–48, 48–49 and 49–50% white fibre) as well as three of 2% (46–48, 47–49 etc.), two of 3% and one of 4%. Most of these possible steps were included in the cloth. Three or four inches were woven between each pirn change, and precautions were taken to minimize the differences in appearance often associated with pirn changes between identical yarns.

The cloths were desized, scoured in Lissapol L and ammonia solution, cylinder-dried, and examined on a table, with the incident light at various angles to the weft yarns, by a panel of observers. The differences were more clearly seen in the cloth than on the bobbins or in the wrappings. In the cloth, they were more prominent when the proportion of weft on the surface was high. The conclusion reached was that where the proportion of white and black fibres is about the same, as with the group of Table 1, a 1% difference in composition does not give rise to a visible shade difference; a 2% difference can be seen with certainty, and greater differences give rise to very prominent bars. The tolerable difference in composition when the fibre proportions are approximately 33 : 67 or 67 : 33 is below 1%, and, when the composition is near 15 : 85 or 85 : 15, it is not more than 0·5%; that is, a pirn with 15·5% white (or black) fibre is distinguishable from one containing 15%.

Substantially similar results were obtained from similarly spun and woven groups of 12s yarns containing black and white fibres, and from blends of black viscose rayons and matt cellulose acetate.

Blends of Two Coloured Fibres.—It would be expected that when the contrast in colour between the two components is less than that between black and white, the tolerable difference in composition would be greater, and this has been confirmed. Some combinations, however, are just as sensitive to composition difference as black and white, and one, at least, is more sensitive. Yarns were spun from mixtures of coloured viscose rayon fibres in proportions 50 : 50, 49 : 51 and 48 : 52, and two blends from each pair of colours were woven side by side.

A 2% difference in composition was visible as a bar, but a 1% difference was not, with the following blends: (*a*) black and white, (*b*) black and red, (*c*) white and red, (*d*) white and blue, (*e*) red and green, (*f*) blue and yellow, (*g*) red and blue.

A 2% difference was not visible with the following: (*h*) black and blue, (*i*) white and yellow, (*j*) yellow and green, (*k*) yellow and red, (*l*) green and blue and it was estimated that the tolerable difference was approximately 3%. A 1% difference was visible in a mixture of black and yellow.

Cotton and "Fibro."—Mixtures of cotton with undyed matt "Fibro" were spun with compositions ranging from 50 cotton: 50 "Fibro" to 40 cotton: 60 "Fibro," in steps of 2%. The fabric was then desized and scoured and dyed with the direct dye Sky Blue FF. In this fabric a difference of 4% did not give rise to a visible bar, but a difference of 6% gave a well marked bar, and the tolerable difference was estimated to be about 5%.

World Wool Imports

Imports of raw wool into the major consuming countries of the free world in the first quarter of this year are estimated to have fallen by about 17% when compared with the same quarter of 1957. The U.K., France and Belgium each showed falls of around 14% between the two periods, but imports into the U.S., Japan and Western Germany dropped by about a quarter in each case, reports the Commonwealth Economic Committee. Italy, by contrast, showed no reduction when compared with a year ago, and Sweden actually recorded an improvement. World exports of tops during the same quarter were about 12% lower than in January - March 1957, but showed a 10% improvement on the immediately preceding quarter. Compared with Oct. - Dec. the country showing the greatest recovery in its export trade was Uruguay (where combers had experienced exceptional difficulties in the closing months of last year), while U.K. shipments rose by 8% and those from France and South Africa were also higher.

Engineering of Fabrics from Blends with Synthetic Fibres*

A discussion of the objectives, principles and methods of blending fibres as applied to "Orlon" acrylic fibre, "Dacron" polyester fibre and nylon

By R. M. HOFFMAN and
R. W. PETERSON†

BLENDING offers new ways of reaching new and better fabrics in which the good features of one fibre augment and complement those of another. By the careful proportioning of two fibres which are at the opposite ends of the scale for a certain property such as moisture-sensitivity, it is possible to adjust the property to precisely the desired level in the fabric. This paper covers some of the basic principles and methods of blending with emphasis on recent information obtained in our laboratories from blending studies on fabrics in which one of the components is "Orlon" acrylic fibre, "Dacron" polyester fibre, or nylon.

In any study of the properties of blends, it is necessary to distinguish between the *intrinsic* properties and the *dimensional* properties of the components. For example, the liveliness, bounce and stiffness of wool fabrics are increased by the addition of small amounts of mohair. With man-made fibres, desirable effects can be achieved by the controlled blending of fibres of two or more deniers. As the fibre diameter is gradually decreased, both good and bad effects accompany the change. The fabric softness, wettability, comfort and cover may be improved at the expense of liveliness and resilience. Other properties such as lustre, friction, cohesion, bulk, drape, resistance to pilling, and durability may be altered. Blending large and small fibres together can often combine some of the advantages of each and may sometimes surpass the best level for a given property that can be obtained with uniform deniers. Denier blending can be used to improve spinnability by increasing the number of fibres per yarn without the loss of stiffness encountered if the number of filaments is raised by using a lower, but uniform, denier. For example, a fabric made from 4·5-den. fibres can be matched in stiffness by one made from a 50/50 blend of 6-den. and 3-den. fibres. The yarns in the latter fabric contain 12% more fibres and thus spin better.

Table 1

Fibre	Major Attributes	Typical Weakness
"Dacron"	High resilience, wet or dry, outstanding ease of care	Static, hole melting
"Orlon"	Good aesthetics, bulk, ease of care, good wickability	" " "
Nylon	High strength and durability, high elasticity and heat settability	" " "
Wool	Hand, bulk, dry resilience	Water-sensitivity
Cotton and rayon	Economy, high moisture content	"
Acetate	Good aesthetics, economy	Low durability

Blending Different Fibre Types

To achieve top performance, it is logical to view the available fibres as a community from which we may select the team best fitted to do the job. Good selection of this team requires a knowledge of the strong points and weaknesses of the candidates. Frequently the obvious best candidate in terms of the primary requirement is imperfect in a secondary requirement. Quite often, blending can correct such an imperfection.

It is interesting to note that many of the specifications for the mythical "ideal fabric" may be phrased in terms of defects to be avoided. Except for the wish of most people to be attired attractively and fashionably, the majority of their additional clothing wants can be stated as "don'ts": don't cling, chafe, scratch, fade, shrink pucker, rip, wrinkle, collect soil and odours, or be too warm or cold. These things are distractions which call our attention to our clothing.

As a first step in blending to achieve the best combination, it is helpful to consider in general terms what might be called the one or two major personality traits of the various fibres. In blend studies of our fibres with wool, cotton and rayon, we regard them along the lines outlined in Table 1.

After a definite end-use is specified, numerous fibre characteristics in addition to these in Table 1, as well as the geometry of the yarns and fabric, and the fabric finishing steps, must all be taken into account in order to produce the best result. It is obvious that a fabric can be no better than the level of properties inherent in its fibres. A fabric can, however, fall short of this level by improper design and finishing. This has happened in the case of several of the newer, more durable fibres, when one of their virtues—durability—became a defect in the form of pilling, until the appropriate method of fabric design and finishing could be found.

Blending Filament Yarns by Double-End Texturing

In addition to blending staple fibres, it is possible to make filament yarn blends. An example of this would be the combining of "Dacron" polyester filament yarn with "Cordura" rayon filament yarn to give a polyester/cellulosic blend. It was anticipated that such a combination would be

* *Abstract of a paper given at the annual conference of the Textile Institute at Edinburgh.*

† *E. I. du Pont de Nemours and Co.*

effective in improving the comfort of polyester filament fabrics during hot weather, and in reducing the static build-up of such fabrics during cold weather.

There are several ways of combining two different types of filament yarns in a fabric. These would include, (1) end-and-end, and/or pick-and-pick arrangements of the "pure" yarns; (2) plied polyfibre/cellulosic yarns; and (3) double-end textured polyfibre/cellulosic yarns. This last process is a recent extension of the one used for producing "Taslan" textured yarns, described by L. G. Ray (J. Text. Inst., 1956, 47, P. 567).

In our laboratory, J. R. Bercaw evaluated these three techniques in shirting-weight fabrics. He observed, not unexpectedly, that alternating "pure" yarns resulted in fabric patterning and ridges. Also, the use of plied yarns of "Dacron" polyester fibre and "Cordura" rayon yarn led to an unsatisfactory appearance as a result of differential shrinkage between the two yarn singles. Although both of these effects may have been desirable in novelty-type fabrics, they would not have been satisfactory in shirting-type fabrics. On the other hand, a beautiful appearing fabric of "Taslan" textured yarn resulted from use of double-end textured filling of "Dacron" and "Cordura" in a warp of textured "Dacron."

The warp yarns in these test fabrics of "Taslan" were textured 70–54–0 twist "Dacron." The filling yarns were processed by introducing one end of 40–34 "Dacron" with one end of 40–20 "Cordura" into the texturing jet. The product was stable to subsequent quilling and weaving. Comfort tests on shirts made from this fabric gave very favourable results as shown in Table 2.

Table 2
Comfort Ratings of Men's Shirts
(90°F—80% r.h.) Scale: 0—Comfortable to 5—Very Uncomfortable)

Fabric (2·4 oz. broadcloth)	"Dacron" %	Fabric Wt. (oz./yd²)	Comfort Rating
"Taslan" textured "Dacron"	100	2·4	3·4 ± 0·4
"Taslan"—Test A (filling of "Dacron" and "Cordura") ..	80	2·5	2·3
"Taslan"—Test B (warp and filling "Dacron" and "Cordura"	65	2·4	1·5

A spun batiste shirting of 65% "Dacron" polyester fibre and 35% cotton has a comfort rating of about 1·4. Commercial cotton shirts range from 1·4 for lightweight batiste to 2·5 for regular broadcloth and Oxfords in comfort tests under these same conditions. Differences of about 0·5 unit in comfort ratings are generally significant with 90% confidence in making comparisons within any one test series. Static build-up was also rated subjectively under controlled conditions. The data show significant improvements in the reduction of static build-up through the use of cellulosic fibres as a minor blending component.

Blends by Differential Overfeed Texturing

The outstanding results of double-end texturing led to another new development, "differential overfeed texturing," which can be applied toward engineering tailor-made yarns for specific end-uses. Two (or more) filament yarns can be fed simultaneously into a texturing jet under two different rates of overfeed. Overfeed means that the yarns are supplied to the jet at a rate faster than the wind-up speed. With proper selection of yarn counts and mechanical overfeeds, a yarn can be made with a relatively heavy-denier-per-filament stress-bearing inner member surrounded by an envelope of light-denier-per-filament yarns. This technology has been recently applied in our laboratory to prepare a tropical-weight suiting of "Dacron" polyester fibre and "Cordura" rayon yarn. In this particular case, 70–14–0 twist "Dacron" was fed into a texturing jet with 3% overfeed. At the same time, two other yarns, 70–54 "Dacron" and 40–20 "Cordura" were simultaneously fed with 10% overfeed into the same jet. The resulting yarn gave a soft-textured tropical fabric of "Dacron" and "Cordura" which benefited considerably in fabric liveliness from the 70–14 core yarn. It had a fine spun-like hand and was pill-free.

The textured yarn process offers new methods of blending two or more yarns by means other than twist; putting them together in such a way that the final product is a single coherent bundle, homogeneous in appearance. The following list outlines some of the possibilities emerging from experimental work along these lines: (1) colour blends. For example, by combining one end of 40-den. undyed nylon and two ends (one blue and one pink) of 100-den. acetate, a novel pastel shade is obtained. (2) Multi-colour loose bouclé. (3) Tight bouclé. (4) Chenille and Angora types. (5) Simulated spun yarns.

An example of this last type occurs in the dual texturing of 30-den. nylon and 55-den. acetate at an air pressure appropriate for the nylon. This produces a yarn in which many of the acetate filaments become broken and extend from the surface, with the resulting appearance of a fine spun yarn.

Sweaters of "Orlon" Acrylic Fibre

"Orlon" is now a basic fibre in the field of sweaters. High-bulk yarns from high-low-shrinkage blends of 100% "Orlon," as well as blends of "Orlon" with other fibres, such as wool, angora and silk, can be used to produce a wide range of products of almost any type of sweater. As is true of woven goods, the properties of these knit fabrics are a function of the weight ratios of the high- and low-shrinkage components. Most commercial fabrics contain about 40% of high-shrinkage fibre and maximum bulk is obtained in the 40–50% range. Bulk falls off rapidly with less than 30% and more than 90% of high-shrinkage fibre.

With the increasing use of blends, so many degrees of freedom in the construction of sweaters have been developed that it has become necessary to study the effects of the more important variables through statistically designed experiments. In our laboratory, we are using the Univac computer to carry out the statistical analysis. Thus far, five key variables involved in manufacture of sweaters from fibre blends have been subjected to this analysis and the results were reported at a recent (Feb. 5, 1958) meeting of A.A.T.T. in New York. The most interesting conclusion reached from this first study was that the key variables selected undergo an interaction; these detailed interrelationships could not have been quantitatively assessed without resorting to a statistical study. The conclusions drawn from the statistical programme have been confirmed by carrying out an actual wear test on sweaters designed according to Univac predictions.

The Comfort of Clothing

Blending two fibres may sometimes give a good result for an unexpected reason. Many persons would expect the addition of a hydrophilic fibre to improve the comfort of a hydrophobic fibre: few would have predicted that such a blend fabric might be more comfortable than one from either fibre alone, yet this occurs with blends of "Dacron" polyester fibre or of "Orlon" acrylic fibre with cellulosic fibres.

The comfort of men's shirts made of various combinations of "Dacron" polyester and "Cordura" rayon yarns

have been discussed earlier under the subject of "Taslan" textured yarns. Similar good results have been obtained with blends of "Orlon" with cotton or rayon. Using knit polo shirtings, made of 80/20 blends or "Orlon" with cotton and cellulosic fibres, comfort tests were run in our controlled-environment laboratory at moderate conditions (70°F., 25% r.h.) using twenty-four subjects and at hot conditions (90°F., 60% r.h.) using twelve subjects. The order of preference for the various blends was established by paired comparisons of unidentified garments. In both environments, it was found that blends of "Orlon" acrylic fibre with rayon or cotton were more comfortable than either 100% cotton or 100% "Orlon." Similar results have been obtained in fine-count broadcloth shirts. In a study of blends of 1-, 2- and 3-den. "Orlon" with cellulosics, it was demonstrated that the lower the denier of the "Orlon" filaments the better the comfort, presumably because the less stiff fibres are less scratchy.

It can be noted that blends of either 1- or 2-den. "Orlon" acrylic fibre with rayon or cotton were more comfortable than either 100% cotton or 100% 3-den. "Orlon." Similar results have been obtained in fine-count broadcloth shirts. These findings are believed to stem from the following factors. Both "Orlon" and cotton offer outstanding wickability, which leads to rapid pick-up of moisture from the skin. "Orlon," the major component of the blend, holds little water within the fibres, thereby allowing rapid drying and avoiding the hot, sticky feeling associated with high-moisture-regain fibres in hot, humid environments. The cellulosic fibre provides sufficient moisture regain to avoid clinging due to static electricity in dry environments. The lower denier "Orlon" filaments provide improved comfort, presumably, because being less stiff, they are less scratchy.

Properties and uses of some "Terylene" Polyester Core-Spun Yarns*

(l. to r.) Dr. P. T. Standring (I.C.I. Ltd., Fibres Division); Mr. J. M. C. Murgatroyd; Mr. K. J. Westrop (I.C.I. Ltd., Fibres Division)

By P. T. STANDRING and K. J. WESTROP†

THIS paper describes the use of cotton/"Terylene" filament core-spun yarns for industrial applications. A new approach is presented in which the object is to provide a "Terylene" high-tenacity filament core with the surface properties of a cotton yarn. Fabrics woven from such yarns, by virtue of their predominantly cotton surface, can be proofed and coated without the use of special techniques normally required for 100% "Terylene" filament fabrics.

There are many potential applications for cotton /"Terylene" core-spun yarns. The uses of greatest interest are those requiring fabrics of high tensile strength, lightness and long life together with surface properties characteristic of cotton.

Tentage.—Tent fabrics produced from "Terylene" filament yarn necessarily require a waterproof finish because of the non-swelling properties of the fibre when wet. The conventional proofing treatments applied to natural fibre materials are not effective and, in practice, it has been necessary to employ special waterproofing agents such as silicones. On the other hand, it should be possible to proof fabrics made from cotton/"Terylene" core-spun yarns by conventional techniques provided that the yarn contains an adequate cotton content. Tent fabrics have therefore been produced from cotton/"Terylene" core-spun yarns, varying in cotton content from 25–50%, and the results of laboratory tests on these cloths are given in Table 1. It will be noted that these fabrics possess high tensile strength/weight ratios, 20–36, in the loomstate condition. For

Table 1

Tent Fabrics produced from Cotton/"Terylene" Core-spun Yarns

Yarn construction	2{50 den. T + cotton		2{75 den. T + cotton		2{125 den T + cotton		2{125 den. T + cotton		2{250 den. T + cotton	
% cotton	30		25		25		50		25	
	Warp	Weft	Warp	Weft	Warp	Weft	Warp	Weft	Warp	Weft
Weight, oz./sq. yd.	3·8		4·8		5·9		6·4		7·4	
Thickness (thou.)	14		15		21		25		27	
Threads per inch	105	83	78	72	60	62	46	49	41	38
Weave	plain		plain		plain		plain		plain	
Resultant denier	148	145	240	225	342	359	489	500	698	738
Breaking load, lb./1-in. strip ..	80	76	127	123	209	213	197	227	279	271
% extension at break	27	21	36	26	43	15	22	21	20	13
Strip tenacity, g. per den. ..	2·3	2·9	3·1	3·4	4·5	4·6	4·0	4·2	4·4	4·4
Strength/weight ratio	20·5		26·0		35·8		33·2		37·0	
Tear strength (lb.)	15	15	30	27	49	29	48	30	85	70
Optimum sett ..	172		145		111		94		81	
Theoretical sett for tentage ..	208		174		133		112		97	

$$\text{Strength/weight ratio} = \frac{1}{4} \times \frac{\text{(warp + weft 1-in. strip breaking load (lb.))}}{\text{Weight of fabric (oz./sq. yd.)}}$$

* *From a paper given at the annual meeting of the Textile Institute in Edinburgh.*

† *I.C.I. Ltd., Fibres Division, Harrogate.*

comparison, values quoted in specification DEF 1107 (Ministry of Defence) for the tensile properties of 100% cotton tentage fabrics in the loomstate condition indicate tensile strength/weight ratios in the range 10–14. The majority of the fabrics described in Table 1 have been woven to the optimum sett, calculated on the basis of Law's theory, but experiments have indicated that this setting is rather too low, and somewhat high finishing temperatures are required to induce maximum shrinkage and thus yield the necessary tightness of sett. Such a treatment, as has been described, does tend to impair the mechanical properties of the fabric and, in practice, it would be better to achieve the required sett, as nearly as possible, on the loom.

Tarpaulins.—High-tenacity "Terylene" filament yarn in tarpaulins offers advantages over conventional materials particularly in respect of high tensile and tear strength combined with lightness, which makes for ease of handling. The more widespread use of "Terylene" filament yarn tarpaulins has, however, been prevented owing to the difficulty of proofing these fabrics by ordinary methods while maintaining air-permeability. Staple-fibre tarpaulins, on the other hand, which can be proofed by conventional means, do not offer the same advantages with regard to tensile and tear strength. Twistless "Terylene" filament yarn fabrics can, of course, be coated with elastomers to produce tarpaulins of outstanding tensile and tear properties. However, such tarpaulins are completely impermeable and, for many uses, a tarpaulin having some degree of air-permeability is required. In addition, it is important in some uses, e.g., roped lorry tarpaulins, that the proofing composition should have a higher resistance to abrasion than is possessed by the majority of elastomer coatings. The use of cotton/"Terylene" core-spun yarns enables fabrics to be produced, having a surface predominantly of cotton, which can, therefore, be proofed by the usual wax or dry chemical finishes.

It has been demonstrated that a plain woven fabric produced from 3-ply/2 × 250-den. "Terylene" + 15% cotton core-spun yarn woven out to a sett of 26 × 26 can be proofed with conventional finishes. The tensile strength/weight ratio of this fabric, after proofing, was 21–22 compared with 6–9 for a similarly proofed cotton duck, a 2½–3-fold improvement. The tear strength/weight ratio for this fabric after proofing was 10–12 compared with 1–2 for a similarly proofed cotton duck, i.e., at least a 5-fold improvement.

However, the waterproof properties of this fabric, proofed both with wax and dry chemical finishes, while adequate, were significantly inferior to those for similarly proofed cotton ducks and, in addition, were more seriously impaired by abrasion. The ultimate resistance of the proofed cotton fabrics to abrasion was also distinctly superior, a feature of the lubricating action of the wax present in both types of finish. This effect is not realised in the core-spun fabrics owing to the comparative ease with which the cotton covering is removed from the filament core, carrying with it the lubricating wax finish.

It is evident that, whilst the tensile and tear properties of this fabric are most attractive, improvement in its waterproof properties and resistance to abrasion are required. It is thought that these two properties are very largely influenced by the sett of the fabric and the amount of cotton present, and that the fabric described was too low in sett (barely optimum) with an insufficient cotton content. A series of tarpaulin fabrics has therefore been produced from cotton/"Terylene" core-spun yarns with higher proportions of cotton than 15% and a considerable degree of oversetting (20%).

Hose Ducks.—It has been demonstrated by laboratory tests that adequate adhesion to rubber can be achieved if the cotton content is 15% or more. Hose ducks ranging in weight from 3·8–15·6 oz./sq. yd. have been produced. Although the tensile strength/weight ratios (tenacities) of the hose ducks are a little lower than those of equivalent structures based on "Terylene" filament yarn, it is considered that the advantages to be gained as a result of the greater ease in bonding to rubber outweigh the marginal loss in tenacity.

Sewing Threads. — "Terylene" medium- and high-tenacity filament yarns have been successfully employed for the manufacture of a large range of 100% "Terylene" sewing threads which are characterized by a high strength, good abrasion- and flex-resistance and a high initial modulus of elasticity. However, a problem associated with the use of such threads is that failure can occur due to melting when high-speed sewing techniques are employed, or during the sewing of heavy canvasses and leather. This is essentially a result of high friction between the needle and the material being sewn. Fusion of the "Terylene" thread occurs if the needle stops. This difficulty has been overcome by the use of sewing threads produced from cotton/"Terylene" core-spun yarns, only small percentages of the natural fibre component being required to impart excellent sewability to the thread. In addition to providing an effective covering which successfully overcomes the problem due to thread fusion, the cotton content of such threads fulfils a further useful purpose in imparting some degree of bulkiness, which assists the thread in filling needle holes more readily than do 100% "Terylene" filament threads.

An Index of Blend Irregularity and its Practical Use*

By M. J. COPLAN, C. A. LERMOND and R. A. KENNY†

EVEN casual visual examination of stock blends composed of two different coloured fibres reveals that the component colours are not distributed in a perfectly uniform fashion. Products emerging from carding, drawing, and spinning similarly exhibit irregularity of colour distribution. Lacking colour differences, blend irregularity is not as striking, of course, but it is evident that the situation would prevail for mixtures of any two types of fibre.

Various experimental techniques can be employed to determine the variability of blend composition, quantitatively. Beyond assigning a numerical value to this variability,

* *From a paper given at the annual conference of the Textile Institute at Edinburgh.*
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however, it is often important to determine whether a product approaches the limit achievable under ideal practical conditions. It therefore becomes necessary to have some idea of what the practical ideal blend irregularity might be.

The purpose of this paper is to describe the utility of previous statistical criteria of blend irregularity to the problem of assessing the effect of processing. In this connection, the irregularity characteristics of ideal random structures are described and the irregularity characteristics of some real products are contrasted with their ideal counterparts. It is to be expected that the results given for the particular type of materials considered may vary depending on specific processing conditions. The examples, therefore, are to be considered mainly illustrative of the technique and, within limits, indicative of the general effects normally resulting from various stages of processing.

In opening, mixing, and scutching operations, the manifest objective is to open the fibre stock and mingle together single fibre units as nearly as possible in a random fashion. It is palpably evident that scutcher lap is not an assemblage of completely randomized single fibre units. Instead, of course, fibre agglomerations remain, and even these may not be randomly distributed.

Throughout the successive stages from carding to yarn, the processes are expected to reduce the size of fibre agglomerations and to a certain extent redistribute the single fibre elements in the attenuated fibre assemblages. The equipment nowhere, however, has the intelligence to select or reject fibres of a given type in order to maintain some strict proportionality between the components. Instead, the best that can be expected is that each successive stage delivers a random assortment of the fibres presented to it. Thus, if a feed product is already randomly distributed, the delivery should also be random. If a feed product is not completely randomized, it is hoped that the manipulations through the process will shuffle fibre positions in the direction of greater randomness.

The concept of random distribution of fibres in spun staple strands is not new, being the subject of considerable attention in connection with problems of linear weight irregularity. As regards blending of two or more fibre types, the concept of randomness is similar in that it postulates that a given fibre has the same probability of locating at a particular spot in the strand as any other fibre. Thus, a fibre will not be rejected or selected according to some definable characteristic such as, say, colour, or species.

Conclusions

The practical limit of mixing either by stock blending or blending by doubling is random distribution of single fibre elements. A measure of blend randomness having practical utility is the Index of Blend Irregularity which provides a direct comparison with the theoretical random limit. A reasonable cause of excessive blend irregularity is believed to be the inability of processing equipment to reduce fibre agglomerations to single fibre elements. It is suggested, instead, that processing randomly distributes clusters of fibres.

It should be understood that, irrespective of whether processing randomly distributes single fibres or clusters of fibres, there will still be found groups of fibres of the same sort lying together. The average number of fibres per group will vary in proportion to the average number of fibres per cluster. An average statistical cluster size can be calculated by two independent methods. It is shown that approximations from total weight irregularity yield values rather larger than, but of the same order as approximations from blend irregularity.

From analysis of blend irregularity along the strand, it is estimated that a single-carded sliver contains unmixed clusters of average size 15 to 35 fibres. Roping delivered directly from a 3-cylinder carding operation is estimated to have clusters of 2 to 4 fibres apiece. Successive stages of doubling and drafting from card sliver to yarn generally seem to reduce the cluster size, as evidenced by longitudinal distribution, to a level of 2–5. Doubling alone, however, cannot be expected to reduce apparent longitudinal clustering, so that any improvement must result from the drafting operation.

Lateral mingling of fibres can be improved simply by the physical action of condensing drawn strands. Although longitudinal mixing cannot be influenced at this stage, a subsequent stage of drawing may take advantage of the better lateral mixing to improve longitudinal randomization. It is shown for several yarns that lateral mixing more nearly approaches the case for randomization of single fibres than is true for longitudinal distribution.

Control of Dust, etc. when Emptying Sacks

THE specially designed "Dustmaster" sack tipping unit announced by Dallow Lambert and Co. Ltd., Thurmaston, Leicester, external ducting, special hoods, secondary dust problems, etc., are eliminated, and replaced by a dust control unit which prevents employees being subjected to unpleasant dust hazards, also breakdowns caused by dust penetration into the moving parts of machines. Wherever sacks are emptied of their contents, be it colour pigment, carbon black, etc., this unit can be applied to satisfactorily control the dust. The unit is designed for easy positioning over hoppers, conveyors, storage silos, etc., and being compact provides no less than 100 sq. ft. of filtration area. Various filter fabrics can be offered for dusts having peculiar characteristics. The fan, directly driven by a 2 h.p. motor, induces a steady flow of air through the counter-balanced door as the operator tips his sack into the hopper below. Collective efficiency is claimed to be almost a 100% and the hinged door automatically closes as the operator withdraws his sack. Using this type of unit, no wastage ensues as the periodic shaking of the filter to dislodge accumulated dust results in it being returned to the system. The filter itself is shaken by a simple but effective mechanism supplied as standard equipment with every unit. Its operation may be either manual by means of an external lever or actuated by a fractional horse power motor, controlled by an electronic timer set to work at pre-determined intervals.

Dallow Lambert patented "Dustmaster" sack tipping unit

Cotton Board Productivity Conference

A Look at the Computer-what it could do for Lancashire*

By J. R. EADES and
K. TYLDEN-PATTERSON†

(l. to r.) Dr. J. M. S. Risk (Hackbridge Holdings Ltd.) and Mr. K. Tylden-Patterson (Production Engineering Ltd.)

THE cotton industry has had to face many difficulties in recent years and in overcoming these difficulties many changes have been brought about. These changes may well have shaken our forefathers, but I suggest the time is coming when the industry will have to take an even bolder step forward. Maybe it should, or even will be the first industry in England, or perhaps I should say in the world, to use electronics and computers on an industry basis. I appreciate there are various sections to your industry, spinning, doubling, weaving, finishing and converting, and that in certain sections there is a preponderance of small firms, or at least small units even where they are members of a large organisation.

Despite these aspects, there are other factors which do indicate that the cotton industry is in a very favourable position for this new development. The industry is compact, it is closely knit, and within one section of the industry the procedures followed by a number of firms are basically similar. These are factors which would certainly tend to simplify the introduction of computers on an industry basis.

One great merit of the computer is its fantastic speed; it can absorb information at 300,000 characters per minute (mean time) and many computers are faster than this. It can also obtain access to information inside the computer in just a few millionths of a second. Another key factor is accuracy. Although nothing is infallible, a computer makes few mistakes. Many of the errors pin-pointed are usually errors made by humans preparing the information for feeding into the computer. This may be either in the basic information that is fed in, or in the actual programme itself which is being designed to guide the computer through its operating stages.

Another factor is storage capacity. This is often referred to as the computer's memory, which is something of a misnomer, but it can store and retain in its equipment a vast amount of information. The limit of this information depends upon the type of computer, but if it is designed to have connected to it external storage units, then the actual upper limit of the store is extremely high indeed.

A computer can also decide between two courses of action. If a problem is put to a computer in a certain way and from that problem a decision has to be made, then provided the programmer knows what he is doing, the computer will make the right decision, i.e., if it is a decision that can be based on logic and not on a matter of opinion. Finally, I would mention another factor. When you have prepared a particular operation for use on a computer, and it is something which occurs frequently, then it can be used again and again. It does not have to be worked out each time the computer uses it, you can refer back to it and can build up a library of what is called sub-routines for use on a computer.

This means that in a particular industry, if there are similar problems encountered in different firms, it does simplify the rather lengthy and tedious operation of preparing work for a computer, for once you have the information in a certain form, and it has been properly programmed, you can use that information as a sub-routine time and again. These factors enable a computer to provide present information faster and often more economically than it is prepared by other means. Also, the exception principle can be exercised far more freely, thus simplifying management control. It provides the accuracy which is vitally important if control returns are to be relied upon, although of course results of the calculations made inside the computer will only be as accurate as the information which has been fed into it from source data. Breakdowns on a computer are certainly far less frequent than absence through ill-health of clerical staff.

This machine is providing flexibility which many large undertakings have needed for a long time. It means that changes can be made in production far more quickly than in the past and that a large organisation can rapidly change its policy and its approach as trading conditions vary. Now as we are

† *Production Engineering Ltd.*

* *Abstract of a paper given at the Cotton Board's Spring Conference held recently at Blackpool*

basically a country of medium sized and small firms I fail to see why the merits and advantages of a computer should not be provided for the majority of our industry—the medium and small sized firms which basically are the backbone of British industry. How can this be done when computers are very expensive indeed? I would suggest this could be done by operating what in effect would be a computer exchange for the cotton industry. You could have a central unit at which information for a whole series of firms in the industry could be processed; the basic information would be prepared at the individual firms, all the work on it would be done centrally, and the information could then be sent back to the firm in the form in which it is required.

The central unit could maintain all the technical staff required, so that no additional staff would have to be taken on by the individual firms. It would mean that instead of having to buy a very expensive piece of equipment, they would be able to use the facilities of the best possible equipment available on the market and only buy as much time as they required, be it half-an-hour or three hours a week.

Small and Medium Size Firms

What information can a computer prepare with advantage for medium sized and small firms? It can do, and in the future will be even more capable of doing, pretty well all the clerical work in industry once the source data has been prepared. It is quite common today to have someone recording the production of individual operators, and then somebody else totalling this up and perhaps the same person or another clerk doing the calculations for wages, and then entering it up hour by hour, calculation by calculation, dealing with the usual tax problems and all the other deductions. Having completed the payroll, and the tax card (prepared perhaps in one or in separate operations), a pay slip for each employee and the coin analysis, the payroll operation is still not finished. Perhaps as a separate function, it is necessary to prepare a labour analysis for labour control in the mill and perhaps again, as a separate operation, doing the costing work which in turn would no doubt be summarised and used for control purposes.

With a computer, all these operations can be handled electronically, the only thing that has to be done is the first recording of the basic facts which have to be processed. These basic facts, if we stick to labour for the moment, are primarily either the amount that a particular operator has to produce, be it in pieces of cloth, or in standard hours, or the number of hours the operator has worked if he or she is on day work. Once this has been recorded on a punched card, merely by marking the punched card in appropriately marked spaces on the card, then all the other information which is required for calculating a person's wage, e.g. his rate of pay, the deductions which are made from his pay (whether he is in a sports club, whether he contributes to National Savings and so on), all his tax calculations can be done automatically by the computer. The complete payroll and the coin analysis can be prepared, all the costing information can be analysed and sorted in the machine itself and just the final results presented in any particular form which is required, whether all the information is required or just specific totals. Control information can be analysed and put out in precisely the same way.

Thinking in terms of a computer exchange for the cotton industry, it becomes apparent that the very nature of the cotton industry which is geographically compact and centred in Lancashire is ideal for setting up such a centre, it makes communications comparatively simple and the common principles applying to the individual sections of the industry should simplify the introduction of a computer. When I say "a computer" that is a figure of speech, it is not possible without investigation to say whether one large computer could handle the requirements of the industry, or whether you need a series of computers. Bearing in mind the size of some of the combines in the industry which may have their own computers it is obvious that the answer will depend on the number of firms which would take advantage of such a service.

Trade Literature

THE NUCLEAR POWER STATION. The purpose of this new booklet by Wakefield-Dick Industrial Oils Ltd., 67 Grosvenor Street, London, W.1, is three-fold: (*a*) to highlight the importance to British industry of the development of nuclear power; (*b*) to explain the structure of the nuclear power industry as at present constituted, and (*c*) to illustrate the way in which a nuclear power station differs physically from a conventional station.

* * *

P.R. "UNIFORM" FANS. Performance tables and dimensions for P.R. "Uniform" pulley mounted fans have been published in leaflet form by The Standard and Pochin Bros. Ltd., Evington Valley Road, Leicester. Designed and built for heavy duties, the robust construction of these fans ensures satisfactory performance under the rigorous operational conditions encountered in the handling of entrained dusts, fumes or hot gases, etc.

* * *

ASCERTAINING FLUID FLOW. George Kent Ltd., Luton, Beds., have released a leaflet announcing the double and single tip "Pitot" tubes. These provide an economic means of ascertaining the flow of fluids in pipes where a more accurate differential pressure producer such as the orifice, Dall tube or venturi tube is not permissible. The leaflet includes an instructional diagram and lists the advantages, disadvantages, applications and specification for this particular type of flow indicator.

* * *

SHORT GUIDE TO CLEAN AIR. The May issue of *The Leeds Journal* contains a supplement, "A Short Guide to Clean Air," designed to provide guidance on the implications of the 1956 Clean Air Act for industry and commerce. The supplement outlines the provisions and scope of the Act and proceeds to deal with industrial fuel efficiency; characteristics of fuels available; emission of grit and dust; notes on the Ringelmann chart; permitted periods for dark smoke emission; the government loan scheme for fuel saving equipment; and fuel saving plant prescribed as qualifying for investment allowance.

* * *

HEXAGON DIGEST. Imperial Chemical Industries Ltd., Dyestuffs Division, Blackley, Manchester. The first of two articles included in this excellent scientific publication is entitled "The Effect of pH in the Batchwise Dyeing of Procion Dyestuffs," by A. M. Wooler. The second is "The Cambridge Textile Extensometer: Modifications and Applications," by S. D. Fletcher.

* * *

STANDARDISED CHAIN DRIVES. The latest catalogue (Ref. 116/130) issued by Renold Chains Ltd., Wythenshawe, Manchester, describes and illustrates their standardised range of chain drives up to 4,000 h.p. Stating that never before have chain drives capable of transmitting up to this figure been catalogued, the company point out that the predecessor of this catalogue—issued pre-war—listed drives up to 1,250 h.p. This new publication includes a valuable amount of important information and data, such as notes on chain selection, load classification, selection factors, a nomogram to determine the number of wheel teeth, drive dimensions, chain length and centre distance calculations, notes on erection and maintenance, tools, etc., standard keyways and pitch circle diameters.

TEXTILE MACHINERY and MILL EQUIPMENT NEWS

High Temperature Loose Material Dyeing Machines

Available in three basic models, which all take the standard full-size Longclose conical pan loose material container

THE range of conical pan loose material dyeing machines made by Longclose Engineering Co. Ltd., Bowman Lane, Leeds, 10, now includes units for high-temperature dyeing. Available in three basic models (*a*) for operation at temperatures not exceeding 100°C., (*b*) for operation at temperatures up to 110°C. for dyeing wool or wool blends, (*c*) for operation at all temperatures up to 130°C. for full high-temperature dyeing of natural and man-made fibres including "Terylene," etc., the pressurised machines can also be used for dyeing at low temperatures with or without high pressure.

All three versions take the standard full-size Longclose conical pan loose material container with an average capacity of 500 - 600 lbs. for full (reduced loads can, of course, be dyed). The normal temperature type, also available in 150 - 250 lbs. capacity size, has special provision for dealing with angora, cashmere and other fine fibres. The system employed to achieve uniformity of flow (Fig. 1) gives level dyeing with excellent penetration in the minimum time and a great feature of these machines is continuous production with very high output per unit.

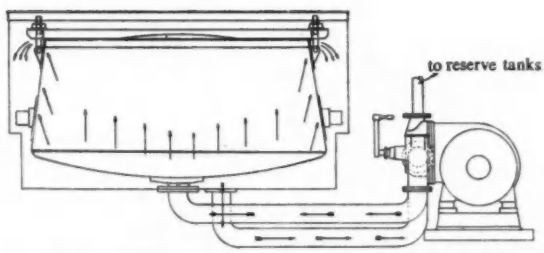
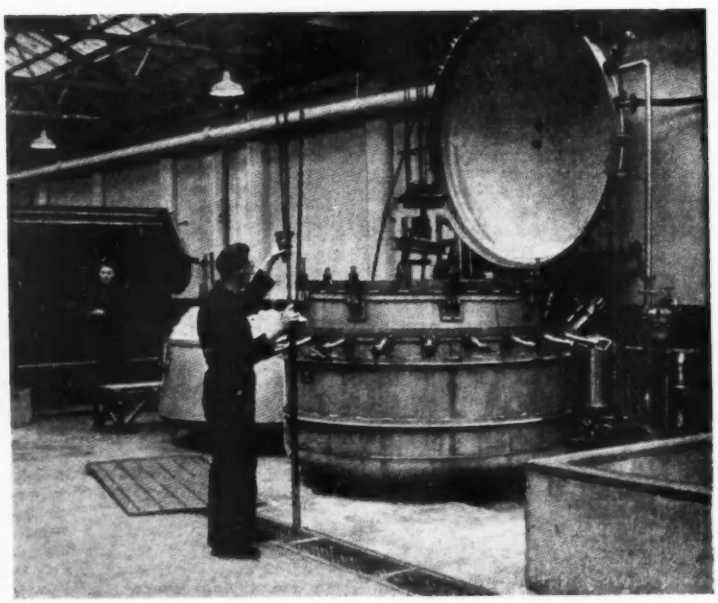


Fig. 1 Diagram showing uniformity of flow to ensure level dyeing

The special conical shape of the material containers avoids "channelling" and prevents movement of the material during dyeing. Pointing out that the condition of the fibres is the same after dyeing as before, the makers emphasise that felting cannot arise since the material is held stationary—only the liquor is moved. The shortest permissible liquor-ratio consistent with level dyeing is used with this method to achieve substantial savings in fuel, dyestuffs, chemicals and assistants, etc.

A self-contained unit installation for continuous operation consists of one machine complete with reserve tank and a conical pan loose material container, one spare conical pan, and a tilting frame and a lifting crane. In operation, the material is pre-loaded into the conical pan outside the machine and, at the same time, the dye-liquor is prepared in the reserve tank. As the loaded pan is entered into the machine, the liquor is run down and dyeing commences immediately.

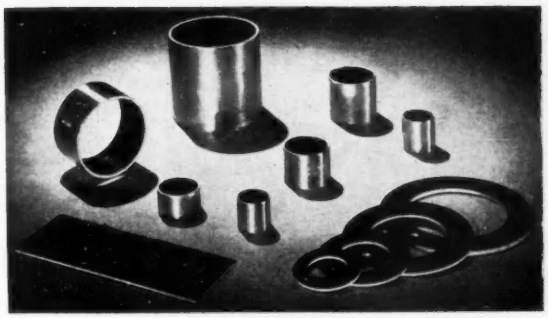
As one dyeing proceeds, the spare pan is loaded and the next dye-liquor prepared in the reserve tank. After dyeing, a continuous wash of clean water is directed through the material and away to waste in minimum time. The pan of dyed material is then removed from the machine so that it is ready immediately to commence the next dyeing cycle. Fabricated entirely in stainless steel, these machines can be employed to dye even the palest or most brilliant shades without risk of stain-



Conical pan high temperature pressure dyeing installation for use with all types of loose material at temperatures up to 130° C.

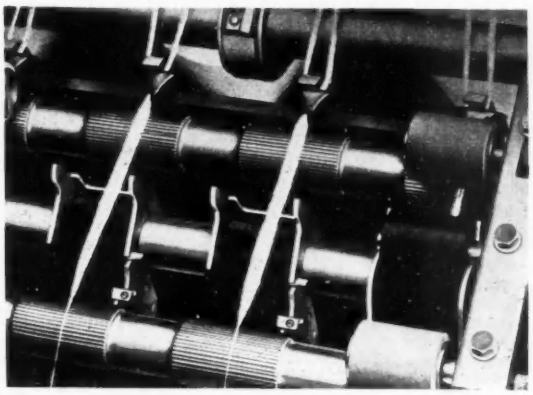
ing or alteration of shade due to metal effects. Cleaning is simplified and turn round of the machines between dyeings of different shades is speeded up. Stainless steel pump, pipes and valves give prolonged trouble-free life. The machines are supplied complete with reserve tank, closed steam coil heating system, thermostatic control and accurately counterbalanced pressure covers. The full high temperature model incorporates addition and liquor sampling unit and sample dyeing unit for external control of the dyeing during high temperature operation. (A pamphlet (CP. 527) recently issued by Longclose Engineering Co. Ltd. describes the machine in greater detail.)

Bearings and Bushes that Need No Oil

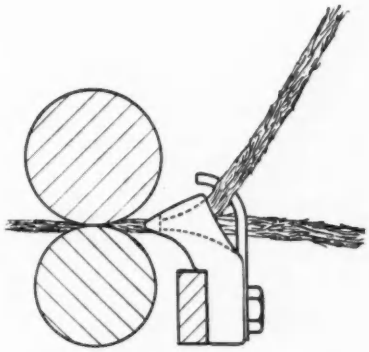


THREE new "dry" bearing materials are new developments announced by Glacier Metal Co. Ltd., Alperton, Middlesex. The first (DU) comprises thin steel strip with a porous bronze coating impregnated with a mixture of a fluorocarbon plastic (P.T.F.E.) and lead. This new material is said to provide three times the load/speed carrying capacity of the company's original DP material which it now supersedes. A stock range of bushes, thrust washers and flat strip are available for manufacturers wishing to conduct their own experiments.

The second (DQ) a fluoro-carbon (P.T.F.E.) strengthened with special fillers. Non-standards or irregularly shaped dry bearings can be simply machined from this material, supplied from stock in standard diameters. The third (DM) is a process for applying an adherent layer about 0·0015 ins./0·0025 ins. thick of a combination of fluoro-carbon and molybdenum disulphide to the bearing surfaces of parts sent to Glacier for treatment.



Top and side views of the Casablancas roving guide



New Ring Frame Roving Guide

WHERE two rovings are doubled on a ringframe for drafting and spinning into yarn, it is important to ensure that they are fed into the drafting mechanism side by side and close together. Unless care is taken over the feed arrangements, some pairs of rovings may become twisted and result in haphazard irregularity in the yarn. Roving guides have been used for some time for feeding rovings into the drafting field but the new Casablancas roving guide has been specially designed to eliminate the possibility of rovings twisting around each other whilst keeping them close together through the drafting zone; in essence it is a funnel with widely spaced twin entries, but a single outlet.

The guide consists of a single funnel, moulded integrally with a shank shaped in such a way that a single screw passing through a hole in the shank holds the guide securely to the traverse bar. This screw also secures a plated metal strip to the rear face of the shank. This strip extends upwards in a curve over the entry to the guide, in such a way that there are spaces for a roving to pass at each side of the strip and also a small gap at the top. Thus there are two separate inlets for the rovings, which are effectively spaced and prevented from twisting. The outlet is a single oval hole through which both rovings must emerge very close together.

In use, one of the rovings is passed through the guide and into the drafting field. The second roving is virtually self-threading, being attached to the first by rolling between finger and thumb in the usual way, and then passed through the gap between the top of the metal strip and the moulding. The first roving draws the second one correctly through the guide, with no further attention from the operator. The Casablancas roving guide is supplied with two sizes of outlet to suit coarser or finer range of rovings, the two sizes being differently coloured. Many spinners who use single rovings may also wish to use a roving guide because of its action in condensing the fibres and so reducing fly; the Casablancas guide is supplied for them with a shorter metal strip that does not divide the entry into two. Use of the roving guide is not restricted to Casablancas drafting, but may be applied to any drafting system.

(left) The "Cadet" lifting platform

Features of Industrial Lifting Platforms

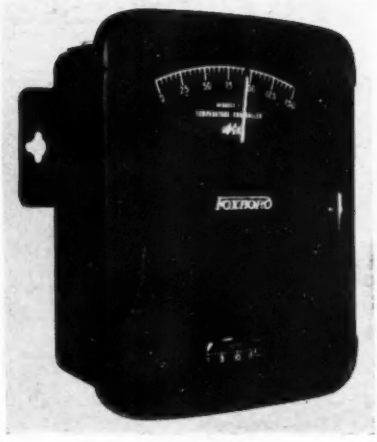
THE Johnson-Vilver industrial lifting platforms shown by C. H. Johnson (Machinery) Ltd., Adswood Road, Stockport, at the recent mechanical handling exhibition represent a simple and inexpensive method of handling goods, between one level and another, without involving extensive and costly alterations to buildings.

A range of four basic types are available which can be simply tailored to suit customers' individual requirements. The loading capacity over this range is 1½ tons to 15 tons, the lifting platform varying in size from 5 ft. × 3 ft. 3 ins. to 26 ft. 3 ins. × 7 ft. 7 ins. The largest size is fully capable of handling a loaded lorry. The firm's "Cadet" lifting platform is the smallest basic unit within the range, having a maximum capacity of 30 cwts. and a platform 5 ft. × 3 ft. 3 ins. Requiring virtually no foundation work, this unit can be accommodated in a position which would be quite inaccessible to other lifting devices such as fork-lifts and, being flush with the floor, does not impede the flow of normal traffic.

Air Operated Indicating Controller

A NEW air-operated indicating controller, the M/41A, is announced by Foxboro-Yoxall Ltd., Redhill, Surrey. This new addition to their range of rectangular cased indicator's controllers and recorders provides on/off or proportional action for pressure, temperature, relative humidity or open tank liquid level applications. It is also made as a pneumatic receiver for 3 - 15 lbs. p.s.i. signals.

The new instrument is economical in size and cost, and for the simpler applications is claimed to offer performance equal to that of more costly and flexible instruments. Standard components are used, mounted in a dust and moisture-proof aluminium case. A specially developed control unit provides on/off action to an eighth of 1% of scale range. The pneumatic proportioning mechanism—fully adjustable from a quarter of 1% to 25% of the scale—provides ample range for a wide variety of simple applications. The M/41A Controller is easy to install and operate. Surface, flush, yoke or valve mountings are available and all operating adjustments are easily accessible.

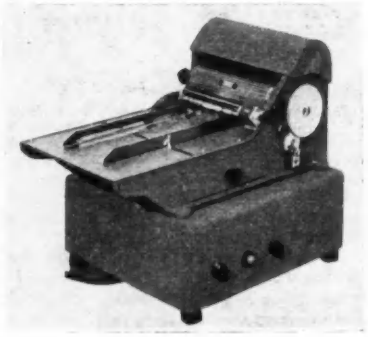


Foxboro-Yoxall's new M/41A

High-speed Ticket Printing

THE new high-speed model, the "Tickopres VM," added by Dapag (1943) Ltd. to their range of rotary overprinting-machines is claimed to make 6,000 impressions an hour.

Powered by a 240 volt a.c. motor, this overprinter is designed to allow the operator to have both hands free for feeding. Accurate registration is retained at full speed on surfaces as varied as card, paper, linen, cotton, satin and film. With a print area of from 1½ ins. square up to 6½ ins. × 5⅝ ins., the machine is said to print almost any kind of labelling item used in the industry, including strung and pin tickets. It may be used for producing control tickets, brand labels, bundle tickets, button-fixing labels, piecework tickets, hanging tags, sleeve tickets, shade or dye-lot tickets, box-end labels, record cards, and dockets. Plates or stereos can be used for brand-names, guarantee labels, etc., and standard type faces of from 8 to 18 point are supplied for letterpress matter. The type, arranged in alphabetical and numerical order in a built-in tray, is set by being slid into a composing-stick and thence into channels on the type-drum. Interchangeable type-drums, slugs, and self-locking "Tickoline" keys that allow lines of type to be stored in trays, permit often repeated items to remain permanently set-up.



The "Tickopres VM"

Packaging and the Textile Trade

IN common with most industries, the textile industry is fighting a battle against costs. Present wage rates, raw material prices and higher overheads are some of the factors contributing to this problem and at times there appears to be no possible way by which the slightest reduction can be achieved, much less maintained. Closer examination, however, will often indicate at least one aspect not always accorded the importance it deserves, i.e., packaging.

Efficient packaging, designed by experts, can save companies many thousands of pounds annually by virtue of the reduction in freight charges, porterage rates, etc., in which they are involved. Like so many other branches of industry, the packaging field is specialised and Venesta Ltd. have for many years made the problems of the textile industry one of its closest studies. As a result, a vast range of skips, barrels, boxes and cases can be singled out as Venesta products for which applications can be found in almost every department of a textile factory.

One extremely interesting example has been the adoption by British Celanese Ltd. of the Venesta plywood barrel for use in the export of Celanese yarns to countries in all parts of the world. Rough handling at docks and goods yards as well as extreme climatic conditions are among the hazards which packed yarn must be capable of withstanding. Moreover, the containers must add to freight and insurance charges as little as possible.

Yarn exported by British Celanese Ltd. is wound on large flange bobbins in which the overall widths vary between 14⅜ ins. and 40½ ins., and the height from 13½ ins. up to 38¾ ins. At first, a variety of cases was tried but the makers point out that it was not until plywood barrels were used that a perfect solution was found. It is stated that tests showed that the plywood barrel had the following advantages:—

(1) It was cylindrical, enabling the flanges of the bobbin to be in contact with the container at all points.
(2) Light in weight.
(3) Needed no battens.
(4) More resilient than the previous forms of packaging used.

All these four points helped to reduce freight and insurance charges.

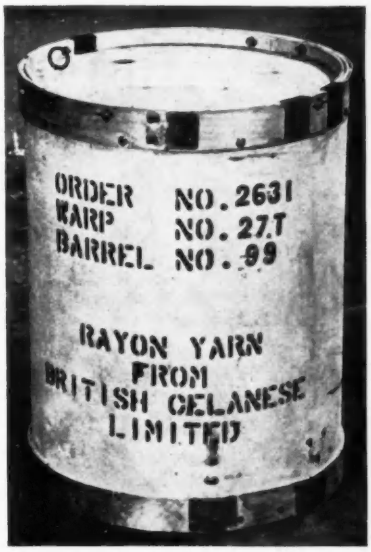
An appropriate comparison between the types of packaging used by the company since before the war can be gathered from the following table, which includes comparative freight costs for a typical market in the Far East:—

	Wooden case	Crated cartons	Venesta plywood barrels
Tare weight of container ..	90 lbs.	45 lbs.	33 lbs.
Shipping measurements in cubic feet ..	15	13·7	11·2
Container cost for identical contents ..	£6. 0. 0.	£5. 12. 0.	£3. 0. 0.
Freight costs including return	£7. 17. 6.	£7. 0. 0.	£5. 18. 0.
Total packing and freight costs.. ..	£13. 17. 6.	£12. 12. 0.	£8. 18. 0.

Experts from British Celanese realised the possibilities shown by this type of container and worked in collaboration with Venesta Ltd. to modify the standard Venesta barrel. From that collaboration has resulted a range of plywood barrels varying in size from 10 ins. × 16⅜ ins. to 14⅝ ins. × 38½ ins. long, depending on whether one or more bobbins are to be packed. The top and bottom of each barrel have external bands of plywood to add strength. All joining is by bifurcated rivets.

A letter from a South African customer to whom the first shipment of yarn was made in the barrel container, was a testimony of surprised delight at the satisfactory state in which the barrels had arrived. Since then thousands of Venesta barrels have travelled across the world in safety delivering Celanese yarns. Package and freight costs have remained relatively low as a direct result of using this strong, light, close-fitting container.

This is only one of the many ways in which Venesta Ltd. are providing invaluable assistance to the textile industry in the form of economic, highly efficient packaging methods. Whichever problems the firm's experts are able to solve on behalf of the textile trade, those solutions will be a tangible contribution towards fighting the familiar battle of high costs.

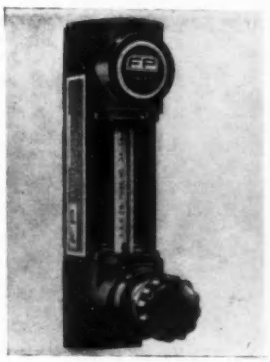


Venesta plywood barrel designed to facilitate yarn transportation with substantial saving in packing and freight costs

Controlling the Flow of Gases or Liquids

FISCHER and Porter Ltd., Salterbeck Trading Estate, Workington, Cumberland, announce the addition to their range of Models 1115 and 1120 Purgerator meters. Although new in the U.K., the F. and P. Purgerator is said to be widely used in the U.S.A. where it has been produced for some considerable time by Fischer and Porter Co., Hatboro, Pennsylvania, U.S.A. The new Purgerator is an inexpensive reduced accuracy indicating variable area flowmeter produced primarily for controlling the flow of gases and liquids at a constant rate for bubbler service applications and purging operations, as with corrosive service manometers. Additionally, it is used in conjunction with the F. and P. constant differential pressure regulator for measuring liquid level in an open tank. For other diverse applications where a small flow-indicator is required the Purgerator is claimed to be ideal.

The meter body, measuring approximately 5 ins. × 1¼ ins. is manufactured from corrosive-resistant, black, phenolic plastic and is available with or without an integral 18/8/3 stainless steel needle valve. The ¼ in. B.S.P.T. or N.P.T. threaded connections inserts may be either in brass or stainless steel. The metering tube is of borosilicate glass, and may be scaled in any desired units of flow for 10 to 1 ranges, from 0·08-·8 c.c./min. air to 142-1,420 c.c./min. water and 3,820-38,200 c.c./min.air.



F.P. constant flow purgerator. Model 1115

1789

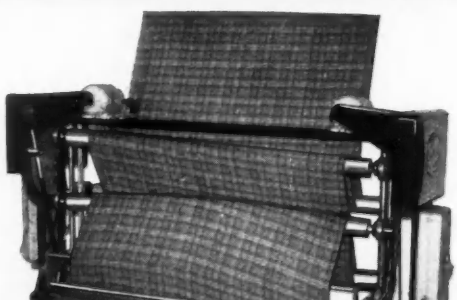
OBRIENS 'CALICO PRINTING' DISCUSSES CROOKED WEFT

however be here faid, that the chief care is to keep the weft as much as poffible in the fame ftate as when woven, that is, in refpect to the direction of the threads; the omiffion of which, even when work is folded to go for fale, is evident in many patterns. As for inftance, if a piece be calendered fo badly, that the threads lay all very obliquely acrofs the table, and the pattern be of a fquare fet kind, it muft be clear that if printed on in fuch a ftate, and in the courfe of the following proceffes the cloth gets into its original ftate, the work will appear juft in the fame oblique direction, as the fhoot of the cloth did when it lay on the table; and inftead of the object being of a fquare kind, it will appear more like a diamond, which is almoft making a different pattern of it, and in the inftances of fmall fprigs or other fet objects, it muft greatly tend to throw them out of fhape and their proper diftances.

it may

1958 The accepted answer to the problem

The Durrant COMBINED BOWED & SKEWED WEFT STRAIGHTENER



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Dyeing of Nylon

By B. C. M. DORSET

The chemistry of the new type of pre-metallised dyes is now very complex. A striking difference between the behaviour of these dyes and the earlier type lies in the fact that they behave somewhat similarly to disperse in that their absorption into wool and nylon fibres follows a single partition rule

WITH the commercial introduction of nylon some twenty years ago there at once arose a demand for dyes and dyeing methods by which yarns, fabrics, and garments made from it could be coloured either by dyeing or printing methods. Much the same circumstances attended the introduction of the first semi-hydrophobic fibre acetate rayon some twenty-five years earlier. In both instances a new fibre was introduced and dyers found that the dyes in common use and readily available had but little affinity for it. What was to be done? In the case of acetate rayon the first reaction was that the fibre should be modified in some way to allow the application of these dyes. Thus saponification treatments for acetate rayon came into use generally with unfortunate results for while the new fibre could be treated with alkalis to regenerate cellulose and so make the fibre receptive to all the cotton dyes it had to be admitted that the saponified fibre was much less valuable than in its original acetate form.

As is now well known it was only when the proper course was adopted of producing dyes especially for the new fibre and taking this into use in the textile industry as a new fibre to be kept in its normal condition that acetate rayon gradually achieved the success recognised for it today. So when nylon was first introduced the mistake was not made of modifying it and making it suit the dyes and dyeing procedures then practiced but of firmly insisting that these must be modified to suit nylon. As we now know, in the intervening years the colouring of nylon has been steadily improved so that while there are numerous difficulties it is possible to dye nylon materials by acceptable methods and in a wide range of fast shades. It is expected that in coming years the dyeing and printing of nylon goods will be similarly steadily perfected.

An important early discovery about the dyeing properties of nylon was that it could be dyed with acetate dyes of the insoluble disperse type and which are now generally termed simply disperse dyes. These dyes are characterised in containing no water-solubilising groups such as carboxylic (COOH) and especially sulphonic acid (SO_3H) groups so that they have to be finely ground and dispersed in water (usually a dispersing agent is present) before they can be presented to the nylon material uniformly and with the dye particles so small that they can readily pass in and between the fibres to become absorbed on the fibre surfaces and then pass into the interior of the fibre by a process of dissolution (the dye dissolves in the fibre substance which in this case of polyhexamethylene adipamide or nylon 6.6).

Since for dyeing acetate fibre materials most dyemakers had from about 1920 been steadily discovering new disperse dyes and had made available a full range of such dyes capable of covering the spectrum, nylon was in the fortunate position of being able at once to take advantage of this happy situation. There is no doubt but that if such disperse dyes had not been available the successful introduction of nylon would have been very much more difficult than it actually was. But apart from the valuable feature that these dyes could at once be used for the colouring of nylon using simple dyeing procedures there was another point of considerable interest—it was concerned with level dyeing.

Effects of Stretch

It may be recalled that in manufacturing nylon threads by the now well-known method of melt-extrusion the first formed threads have a tensile strength somewhat below those of say viscose rayon and are much too easily extensible to make them acceptable for knitting and weaving where the threads may be subject to sudden strains. These newly formed threads are therefore highly stretched to say about four times their original length which brings them to a new stable condition in which they have a tensile strength at least twice that of viscose rayon and an extensibility of 20 to 30% which is acceptable. But in the stretching the power of the nylon threads to absorb dyes is considerably reduced. Since it is difficult to ensure that all the threads throughout their great length are uniformly stretched it is quite possible that they may have different dyeing properties from one part to another so that fabrics woven or knitted from them may dye unevenly.

This fault was much experienced in the early days of nylon production and it resulted in the nylon hose then being largely produced having bands of different depths of shade. This was at the time partly overcome by knitting the hose with three different threads instead of the usual one by a so-called "three thread carrier" system and in this way mixing the threads so as to obscure differences in depth of shade. However, since then much improvement of manufacture has been attained so that troubles of this kind are less frequent. The point of importance at that time however was that of all the dyes applicable to nylon the disperse dyes least revealed these uneven dyeing properties in the hose and other materials—the few acid wool and other types of dyes which were found to have a useful affinity for nylon in addition to the disperse dyes all accentuated rather than obscured these dyeing differences in the nylon threads. Since those early days methods have been found to apply other types of dyes to nylon than the disperse dyes but on the whole it is these disperse dyes which are most useful for the dyeing of nylon materials in which different qualities of nylon threads are present, that is, threads which differ among themselves in respect of their affinity for dyes.

With the expanding use of disperse dyes for nylon goods much research has been carried out to discover new dyes of the same type but having improved dyeing properties. Thus during the past twenty years many new disperse dyes have become available and this has been to the benefit of both nylon and acetate fibres since in many instances the same dye is useful for colouring both types of fibre. The disperse dyes remain of great importance for the dyeing of nylon goods in spite of the fact that other dye types, notably the acid and other kinds of wool dyes, can now be employed by making use of special modifications in the dyeing process. It may therefore be asked what properties have these disperse dyes which make them so much favoured?

In answering this query it is necessary at once to point out one main advantage of disperse over other dyes for nylon—it is that the nylon shows sufficient power to absorb them that they can be used for the production of deep shades (in dyeing parlance the disperse dyes are said to build-up well). With other types of dyes which possess some affinity for nylon it is impossible to dye a really deep shade since the nylon soon becomes saturated with the dye and this at a stage when only a pale to medium depth of shade has been produced. Yet even with disperse dyes it is generally found that acetate fibres dye (together with nylon) to a considerably deeper shade than do nylon fibres. The behaviour of nylon fibres in being relatively soon saturated with a disperse dye as compared with acetate fibres is shown by the data (Table 1) obtained by Vickerstaff ("The Physical Chemistry of Dyeing," p. 368) from investigations in which nylon and acetate fibres were together dyed for 24 hours at 80°C. and the dye then extracted from the fibre using a suitable solvent and then being weighed:—

Table 1

Disperse Dye	Grams of Dye Absorbed per 100 g. fibre	
	Nylon	Acetate
Dispersol Fast Yellow 2G150	0·6	1·8
" Yellow 3G150	2·0	5·0
Duranol Blue 2G300	3·5	10·0
Dispersol Fast Orange G150	3·5	14·5
" Fast Red A150	6·5	16·5
Duranol Violet 2R300	5·0	9·5
" Red G300	24·0	28·0
" Brilliant Violet B300	25·0	59·0
Dispersol Fast Crimson B150	7·0	11·5

These results show that the disperse dye saturation values for nylon and acetate fibres are about 5% and 10% respectively so that acetate fibres absorb about twice as much dye as nylon fibres if the dyeing process is allowed to continue for a prolonged period; somewhat different results will be obtained if the dyeing is allowed to continue for only about one to two hours (large scale conditions of dyeing).

But however poorly nylon may absorb disperse dyes in comparison with acetate fibres it is a fact that this absorption is quite good compared with the absorption of other dyes by nylon. This is thus one reason for their general usefulness for nylon dyers. Another reason has already been mentioned—the fact that disperse dyes have only a moderate tendency to reveal any differences in dyeing properties characterising the nylon threads in the textile material being dyed such differences being largely due to an uneven "drawing" of the threads during earlier manufacturing operations. But there is yet another reason—it concerns the compatibility of disperse dyes.

Compound Shades

In the dyeing of cotton, wool, and the older hydrophile fibres it is usual to assume that in dyeing with mixtures of dyes no one dye in the mixture will interfere with the absorption by the fibre of the other dyes and that each dye will be absorbed just as though no other dye were present. Experience with the dyeing of synthetic hydrophobic fibres has shown that this assumption does not always hold true—it is possible in applying some dye mixtures for one or other of the dyes to be absorbed first and so prevent or restrict the absorption of the other dyes. Such incompatibility of dyes can obviously make it difficult for the dyer to arrange his mixture of dyes and then be sure that the expected shade will be obtained. In the dyeing of nylon with disperse dyes comparatively little trouble is encountered from incompatibility of these dyes but it is otherwise with say the acid wool dyes so that in using these care has to be taken in selecting individual dyes which are required to be applied in dye mixtures.

Since most compound shades can be produced with the aid of mixtures of yellow, red, and blue dyes it is useful to note an observation by Vickerstaff that a combination of disperse dyes which has been found very satisfactory in large scale dyeing consists of Dispersol Yellow A150, Duranol Brilliant Blue B300, and Dispersol Fast Red R150. It may be further noted that these particular dyes are fast-dyeing dyes.

But while the disperse dyes are thus shown to be very useful for the colouring of nylon goods since they can be applied by simple methods and give deep shades more readily than other alternative types of dye and generally give level shades on goods which have a natural tendency to dye unevenly they do suffer from one disadvantage which is more particularly revealed when it is desirable that the coloured nylon goods shall have an especially good fastness to washing at high temperatures, say exceeding 120°F. The use of disperse dyes does not allow the production of coloured nylon goods having the highest degree of fastness to washing and which is possible using other types of dyes such as wool dyes. But note may here be taken of a recently devised after-treatment which can much increase this washing fastness. Actually the treatment has been devised more particularly for improving the washing fastness of dyeings on acetate goods produced with disperse dyes but it is claimed (B.P. 794,179) to be equally applicable to dyed nylon materials. It is necessary however that the disperse dyes present in the nylon material shall contain reactive amino and/or hydroxyl groups but there are many such disperse dyes now in use and among these may be noted the important group of aminoanthraquinone and hydroxyanthraquinone dis-

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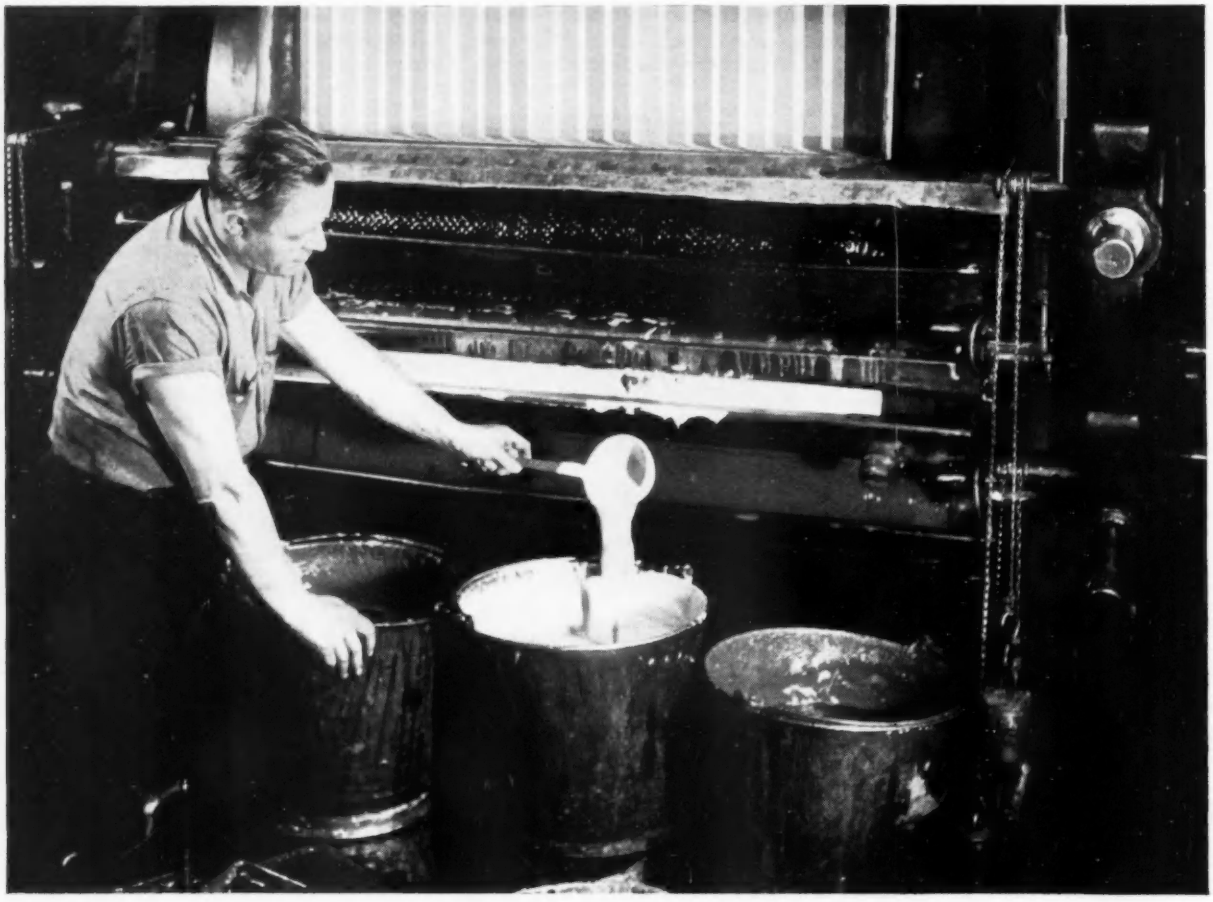

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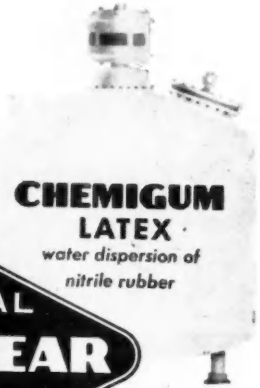

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perse dyes which include many blue and violet dyeing members.

The after-treatment is based on the ability of such a dye to enter into chemical combination with a substance resulting from condensation of urea, melamine, and similar amino-containing substances with formaldehyde so as to give a water-insoluble dye complex. Such treatment is however modified so as to include the application of free formaldehyde also so that this dye complex can further become cross-linked to the cellulose acetate or nylon molecules and in this manner securely fix the dye to make it highly resistant to removal by washing treatments even when these are carried out at temperatures of 165°F. and above. It is claimed to be a further advantage to include in the after-treatment a metal such as copper in the form of a chelate compound which yields only relatively small amounts of free copper ion; Cuprofix 47 is a compound of this type.

A convenient method for achieving this considerable increase of washing fastness in a nylon material dyed with disperse dyes of the kind noted above (such dyes are preferably applied at temperatures approaching 100°C.) consists of impregnating the dried fabric with a liquor containing 15% of a product such as Sandox Resin EN which contains 50% of the active ingredient dimethylol urea, 10% of Rhonite R-1 which contains 50% of the active ingredient N: N¹-di (hydroxymethylethylene) urea, 3% of Cuprofix 47, 1½% of catalyst G-8 (a mixture of an organic amine hydrochloride and formaldehyde), 1% of Softener H (a cationactive agent). Then follows drying on a pin-stenter at 275°F. for 4 mins. and a subsequent curing for 7 mins. at 320°F. The fabric is finally thoroughly washed and dried.

Obviously this after-treatment can be advantageously employed for goods containing mixtures of nylon and acetate fibres dyed with disperse dyes of the selected type, that is, those containing reactive amino and/or hydroxyl groups.

Disperse dyes based on anthraquinone derivatives (many of these are blue to violet) have about the same fastness to light on nylon as on acetate fibres but other types such as those having an azo structure and which include many red, yellow, orange, and scarlet dyes have inferior light fastness on nylon. It is, however, a very good feature that those blue to violet dyes which are sensitive to gas fading on acetate fibres are quite fast on nylon under the same circumstances. Although azo yellow disperse dyes have about the same fastness to light on nylon and acetate fibres those yellow dyes which are based on diphenylamine derivatives are less fast on nylon.

On the whole the disperse dyes have proved very useful for the colouring of nylon and especially in the early years when nylon was first being used in the textile industry. Yet because of their failure to give shades having the highest fastness to washing it has become necessary to seek other types of dyes. An early assessment of the usefulness of the various classes of dyes suitable for dyeing nylon indicated that the acid wool dyes and also the pre-metallised and chrome dyes would be unlikely to prove useful. But subsequent investigations have shown the error of this view and these wool dyes are now proving quite satisfactory and they are especially useful for the production of wash-fast shades. Success in using them has come from the adoption of special dyeing procedures designed to aid dye absorption by the nylon fibres.

Wool and Nylon

When the chemical compositions of wool and nylon fibres are compared it is seen that both fibres should have similar dyeing properties in so far as both fibres contain basic atomic groupings which should attract dyes whose anions are coloured, for example, acid dyes. It is believed that in dyeing wool with an acid dye the basic wool combines chemically with the acid dye in much the same manner as an inorganic base—such as caustic soda—does with the mineral acid sulphuric acid to form the salt shown in Fig. 1.

Fig. 1 $\underset{\text{wool}}{WX} + \underset{\text{dye}}{DY} \rightarrow \underset{\text{dyed wool}}{WD} + XY$

where W represents the basic portion of the wool fibre, D represents the coloured acid part of the acid dye, and X and Y represent anions and cations respectively.

The capacity of nylon and wool to combine with acid dyes will thus be roughly proportional to their basicity and this can be measured by their capacity to combine with an acid say sulphuric or hydrochloric acid. A number of different workers have investigated this aspect of the basicity of nylon and wool and they find that

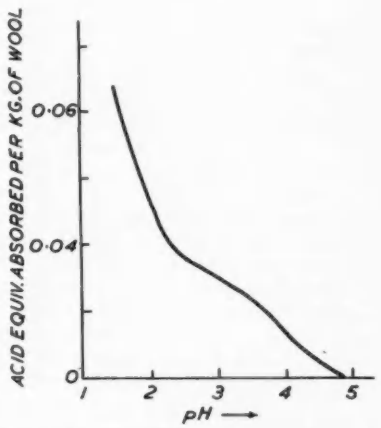


Fig. 2. Curve showing the absorption of hydrochloric acid by nylon, from aqueous solutions of the acid having a pH of 1 to 5

approximately wool is about ten times more basic than nylon and is thus able to absorb by chemical combination a proportionally greater amount of dye. However, the acid-combining powers of both fibres are modified by the pH of the acid liquor used and this is illustrated by the curve in Fig. 2 which shows the absorption of hydrochloric acid by nylon in hydrochloric acid solutions of increasing strength (pH). Thus at pH 5 (a relatively weak solution of hydrochloric acid) nylon is scarcely able to combine with any acid but as the pH of the surrounding acid liquor is lowered acid combination with the nylon takes place to a steadily increasing degree until a point is reached at pH 2·5 approximately when the nylon absorbs about 0·037 equivalents of hydrochloric acid per kg. of nylon. At this point a further lowering of the pH produces a steeper rise in the amount of acid combination so that at pH 1·5 the nylon absorbs 0·08 approximately equivalents of the hydrochloric acid. It is found, as perhaps might be expected, that nylon is able to absorb more of an acid dye as it is applied under these more strongly acid conditions.

An explanation of the above experimental facts can be given along the following lines. The nylon molecule contains two types of basic groups—the terminal amino (NH_2) groups and the amide (CO.NH) groups which are regularly spaced along the nylon molecule joining end-to-end the adipic acid and hexamethylene diamine residues as represented thus in Fig. 3:

Fig. 3 $NH_2-(CH_2)_6-NH.CO-(CH_2)_4-CO.NH-(CH_2)_6-NH.CO\cdots$

terminal amino group — spaced amide groups

It is believed that the terminal amino groups are the more reactive and that they take part in dye combination from the commencement of the dyeing operation provided that the pH of the dye liquor is lower than 5. When all of these terminal amino groups have taken part in the dyeing process the depth of shade will be comparatively small. But if the dye liquor is made more acid so will the amide groups play a part and it is believed that this part becomes greater as the pH of the dye liquor is lowered. Thus the dyeing of nylon with acid wool dyes becomes practical by the use of a suitably acid dye liquor.

There is one other feature of the dyeing process which ought to be mentioned. If nylon is heated with hydrochloric acid solution the hexamethylene diamide becomes hydrolysed and the long chain molecules break down into shorter molecules—ultimately hydrolysis is complete so that the nylon molecule is broken down into the components hexamethylene diamine and adipic acid. It is obvious that with such changes an increasing number of terminal amino groups is formed and that the amide groups become more accessible to the dye so that the nylon in its partly hydrolysed state will dye to very deep shades. Such treatment with hydrochloric acid is one method for increasing the dyeing power of nylon and it is one which can be used for special purposes. But with this hydrolysis the fibres become tendered and this is permissible only to a small degree. However the general principle remains—by the use of acid conditions in dyeing or as a pretreatment nylon goods can be dyed with acid dyes to the deep shades which are often required. And the important point is that these shades obtained with acid dyes can be much faster to washing and can often be much brighter in tone than shades obtainable with the disperse dyes already discussed.

As showing how inferior to wool is the affinity of nylon for acid dyes the data (Table 2) obtained by Skinner and Vickerstaff (J. Soc. Dyers and Col., 1945, 61, 193) are clearly illustrative:—

Table 2

Fibre Dyed	Dye absorption at saturation point of Solway Blue B (in gram equiv. of dye per kg. of fibre)	
	Dyed at pH 1·6	Dyed at pH 1·35
Nylon ..	0·056	0·084
Silk	0·185	—
Wool ..	0·718	0·935

It has been mentioned that the disperse dyes do not accentuate any differences of dyeing properties among nylon fibres arising from uneven drawing during manufacture, but the same is not true for acid dyes. Indeed this type of dye does readily show up such drawing differences. This defect of the acid dyes must therefore be added to that by which these dyes will in many instances not build-up, during the dyeing, really deep shades. There is yet a further defect that these dyes at dyeing temperatures below 100°C. do not readily migrate so that it is the more difficult to produce uniform dyeings. However the advantages that they have—the production of bright fast-to-washing shades—has led to much work being done to devise dyeing conditions conducive to mitigating such faults.

Developments

Two main lines of progress have been followed. These are a raising of the dyeing temperature above 100°C. and the addition to the dyebath of so-called dye-carriers (these may often be effective also as fibre-swelling agents). Both of these special dyeing conditions are related to the use of a high concentration of acid in the dyebath mentioned earlier in that they at least result in a loosening of the nylon fibre structure so as to assist dye penetration and make available more dyeing "sites" (points in the nylon chain molecules where dye can become attached securely). As a matter of fact these new conditions of dyeing have become generally acceptable for promoting the easier dyeing of all the hydrophobic synthetic fibres such as "Orlon," "Dynel," "Terylene," etc., since they all have a very dense structure which resists dye penetration.

An advantage of these dyeing expedients additional to the fact that they enable more dye to be absorbed by the nylon is that dye absorption can be very much more rapid, so that within a few minutes more dye can be absorbed than could be absorbed in as many hours under ordinary dyeing conditions. The high temperature dyeing of nylon goods has in recent years been much facilitated by the makers of dyeing equipment giving this aspect of dyeing their special attention and so becoming able to provide the necessary dyeing machines. At the same time dye makers and manufacturers of textile auxiliaries have introduced organic dye-carriers which can be added in small amount to the dyebath to accelerate and increase dye absorption. With both methods for assisting dyeing there are corresponding disadvantages and it is often not easy to make the best choice. With high temperature dyeing equipment it is necessary for this to be totally enclosed so as to allow the circulating dye to be held under pressure (appropriate to a dyeing temperature of up to 130°C.) and this gives the dyer less scope for handling the nylon material during dyeing and for keeping it under visual observation. On the other hand, some of the dye-carriers which are most effective are relatively expensive and have the defect of being absorbed by nylon to resist removal by washing and of then reducing the light fastness of the resulting shades.

It will be understood that under these circumstances good welcome has been given to a new type of pre-metallised dye which has been found very useful for application to nylon materials. It may be remembered that the earlier types of pre-metallised dyes such as the Neolans required that they should be applied to wool in a strongly acid dyebath, that is, one containing 6 to 8% of sulphuric acid. These conditions can be harmful even to wool if the duration of the dyeing process is unduly prolonged and in fact it has been recorded that when wool is dyed with these pre-metallised dyes for four hours at the boil using 8% of sulphuric acid in the dyebath to promote satisfactory dye exhaustion the wool can lose 30% in strength and, perhaps what is more important, be left very susceptible to further damage under conditions not especially harmful to the original wool. Similarly nylon can be damaged by applying these dyes under the strongly acid conditions normally required.

Comparatively recently discovery has been made of a new type of pre-metallised dye which can be applied under substantially neutral or only slightly acid or alkaline conditions so that any damage to the fibre can be completely avoided. There is a fundamental chemical structural difference between the earlier and new types in that the latter contain only about one-half of the amount of metal (usually chromium or cobalt). In both types of dye this metal is chemically bound to the azo components of the dye and is in a complex or chelated state so that it is practically non-reactive as compared with a normal metal salt. This new type of dye is being marketed by various firms under such names as Cibalan (Ciba), Irgalan (Geigy), Capracyl (Du Pont), etc.

The important feature of these dyes is that many of them can be satisfactorily applied to nylon under ordinary dyeing conditions, that is without requiring dyeing temperatures exceeding 100°C. and without requiring

the use in the dyebath of a dye-carrier, yet produce deep dyeings having excellent fastness to washing as well as to light. An additional feature is that many such dyes give fast shades of but pale or medium depth—many other dyes are less fast as the depth of shade is lower. Thus at the present time these neutral-dyeing pre-metallised dyes are being increasingly applied to nylon although they were first discovered and introduced for the purpose of dyeing wool.

Pre-Metallised Dyes

It is of course possible to apply chrome mordant dyes to wool and nylon by processes in which the dye and chrome mordant are applied successively (in one special metachrome method they are applied together). The introduction of pre-metallised dyes has for its main object the possibility of pre-combining the metal and dye and then applying the product by a one-stage dyeing operation which can be highly advantageous. The early pre-metallised dyes were easily water-soluble (as desired) and this was obtained usually by having one or more sulphonic acid, SO_3H, groups present in the dye molecule. The new pre-metallised dyes are particularly distinguished by the absence of any such water-solubilising group. Instead of sulphonic acid groups there are present non-ionising sulphone, sulphonamide, methyl and chlormethyl sulphone groups which are very much less hydrophile than a sulphonic acid group but which yet give the dye just sufficient solubility in water to make its application to wool and nylon practical. It seems possible that the dyeing of nylon will make increasingly greater use of these new pre-metallised dyes.

The chemistry of the new type of pre-metallised dyes is now very complex but readers interested will find very useful a full account of the investigations underlying the discovery of the Irgalan dyes as given by G. Schetty (J. Soc. Dyers and Col., 1955, **71**, 705). A striking difference between the behaviour of these dyes and the earlier type lies in the fact that they behave somewhat similarly to disperse dyes in that their absorption into wool and nylon fibres follows a simple partition rule. That is the dye becomes distributed between fibre and dye liquor in proportion to its solubilities in these—it is considered that the metal part of the dye does not take part in the bond between dye and fibre.

The range of Irgalans, Cibalans, Capracyls, etc., is constantly being increased by the discovery of new members. For example a large group of blue to green new dyes has recently been discovered (claimed to have outstanding usefulness for nylon as well as wool and silk) as the result of treating (B.P. 786,928) with a cobalt-yielding agent two moles of a mono-azo compound having the general formula set out in Fig. 4 in which *v* represents hydrogen or methyl, *w* represents hydrogen, chlorine, methyl or nitre, and *R* represents 3′-methoxypropyl or 2′-hydroxypropyl. The —NH—V group is in the 1 or 2 position of the naphthalene nucleus and in the ortho-position to the azo group, and the —SO_2—NH—R group (this is the water-solubilising group which takes the place of the sulphonic acid group usually present in wool dyes) is in the 4 or 5 or 6 position of the naphthalene nucleus. Alternative combinations of two dis-similar mono-azo dyes can also be used.

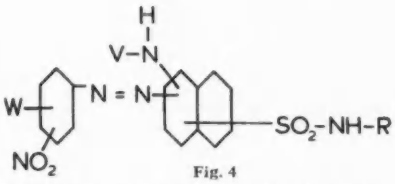


Fig. 4

Thus a blue dye suitable for application to nylon at temperatures which need not exceed 95°C. can be obtained (of the composition indicated above) by coupling diazotised 2-amino-1-hydroxy-5-nitrobenzene with 1-aminonaphthalene-4-sulphonic acid-(2′-hydroxy)-propylamide to give the required mono-azo compound which can then be reacted at the boil with a mixture of cobaltous sulphate, caustic soda, and tartaric acid until all of this metal combines with the dye thereby forming a complex dye in which there is present two moles of the mono-azo dye combined with one atom of cobalt. The nature of this dye is shown in Fig. 5.

The new pre-metallised dyes are also useful in printing nylon fabrics where it is required that deep coloured effects shall be fast to wet processing. From what has been said it may be inferred that there is a greater opportunity to dye nylon evenly and in deep shades when the dye applied is absorbed by a process of dissolution rather than chemical combination—this is exemplified by the dyeing characteristics of disperse and acid wool dyes. Hence a recent move to apply acid dyes in a modified form which forms the basis of the Chemnyle process recently introduced.

It is well known that anionic and cationic substances usually precipitate each other when brought together in aqueous solution; this follows from the fact that their anions and cations are oppositely electrically charged. In an acid dye it is the anion which is the effective coloured constituent and in a cationic auxiliary textile it is the cation which is most effective. Thus it is possible to bring together certain acid (also direct cotton) wool dyes and cationic auxiliaries so that a precipitate is formed. Then by dispersing this precipitate it can be brought into much the same state as a disperse dye. Some progress has been made in applying these coloured dispersed precipitates to nylon and so effecting a dyeing with acid wool and direct cotton dyes. It seems that these coloured dispersed precipitates have a useful affinity for nylon and are readily absorbed to give colourings which in many instances have good fastness properties. The idea is novel and interesting and it is hoped that the process can be brought into general use. There is one snag which might be anticipated but which might be overcome. It is that dyed materials in which some cationic substances are present have been shown to have a lower fastness to light than when the cationic substance is not present.

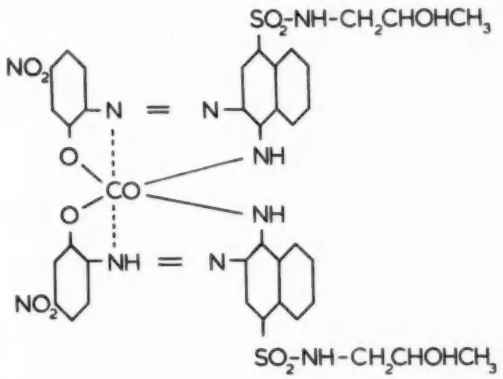


Fig. 5

Printing with Alcian X and Procion Dyestuffs*

Other fast dyes rely for their fastness on the deposition of an insoluble dye which is held physically, whereas the Procions react chemically with the fibre—in cellulose, with the hydroxyl groups

By G. A. BENNETT†

THE Alcian X dyestuffs contain a temporary solubilising group, and are converted to insoluble derivatives by heat; this process is accelerated by the presence of alkali, particularly sodium acetate. Since the appearance of Alcian Blue 8GS about ten years ago, a number of recipes for printing this and subsequent members, particularly the current Alcian X series, have been recommended. This is not the result of the technicians being unable to make up their minds. Various recipes have been developed to allow the printer to exploit fully the versatility of these dyes, and to print them alongside other classes of dyes or in discharge or resist styles. It is not possible on this paper to go into detail of all the recipes available, but I will discuss the two recipes which represent the best recommendation for the direct printing of Alcian X dyes, and which also permit their application alongside various other classes of dyes. Mention has already been made of the fact that insolubilisation of Alcian X dyes occurs at high temperatures and is accelerated by alkali and it is this behaviour which determines the general nature of all printing recipes for this class of dyestuff. The recipes I want to discuss are:—

(1) The acetic acid/urea recipe.
(2) The Alcian Developer X recipe.

I have selected these as representing in the first case probably the most economical and in the second case, the recipe giving the highest fastness to rubbing.

Acetic Acid/Urea Recipe

This recipe is suitable for all members of the Alcian X range. Development is preferably by steaming, but good fixation is obtained by cylinder drying followed by passing through an Alcian fixing bath and alkaline Lissapol ND solution. In making up the print paste the necessary quantity of Alcian X dyestuff is mixed in a dry container with urea, and to this is added dilute acetic acid. By thoroughly mixing the dry Alcian X dyestuff and urea, very rapid solution occurs when the dilute acid solution is added and any tendency to form a tar is avoided. The solution is then stirred into the necessary quantity of thickening. The thickenings most commonly employed are starch tragacanth and we have ourselves often used the thickener Indalca U. This recipe is recommended for use alongside—

Brentamine fast bases and salts.
Brentogen dyestuffs.
Direct and mordant dyestuffs.
Pigment printing compositions.
Soledon dyestuffs.
Soloxan Black S.

By reducing the acetic acid concentration by about one-fifth, i.e. to 10 gm./litre, the recipe may be used alongside vat dyes provided no fall-on occurs. It should be noted that on Brenthol prepared fabrics, the passage through an Alcian fixing bath may be omitted, since insolubilisation occurs rapidly on drying off the acid.

Alcian Developer X Recipe

This recipe is suitable for all members of the Alcian X range and gives excellent build-up and good rubbing fastness. The dyestuffs printed by this recipe require a steaming treatment followed by a passage through an Alcian fixing bath. Good fibre penetration is achieved because of the relatively slow rate of insolubilisation of dyestuffs applied in this manner.

In making up the print paste, the Alcian X dyestuff is mixed in a dry container with Alcian Developer X and then dissolved in warm water. The solution is then stirred into the thickening agent, which already contains a quantity of Alcian Developer X. The reason for incorporating part of the Alcian Developer X in the thickening is that the solubility is insufficient to allow the full quantity to be added to the water used to dissolve the Alcian X dyestuff. The Alcian Developer X recipe is recommended for use alongside—

Brentamine fast bases and salts.
Brentogen dyestuffs.
Direct or mordant dyestuffs.
Soledon dyestuffs.
Soloxan Black S.
Vat dyestuffs (except in close fitting pattern).

Alcian Fixing Bath

It was originally considered essential to apply Alcian Blue 8G from a paste containing a volatile organic acid (acetic acid) and an alkaline salt such as sodium acetate. Later investigation shows that deeper shades having appreciably better wet and rubbing fastness could be obtained by using a substantially non-volatile organic acid (lactic acid) together with hygroscopic agent which also functioned as a solvent for the dyestuff. Using this type of recipe, the sodium acetate was either omitted or used in very much reduced quantities. The use of such a recipe gives a much lower rate of insolubilisation than in the earlier recipe, with the result that even after steaming the dyestuff may not be completely insoluble, therefore some soluble dyestuff remains which can, during subsequent wet treatment, bleed out into the liquor and may cause staining of the white.

The function of the Alcian fixing bath is to temporarily insolubilise this remaining soluble dyestuff until permanent insolubilisation can be brought about during the subsequent treatment in alkaline Lissapol ND solution. Two types of fixing bath are recommended. They are either sodium or potassium bichromate and acetic acid, or Azogard 35% dilution diluted with water. It is immediately apparent that when printing alongside vat dyestuffs, the normal bichromate acetic acid bath for oxidising the vat will also act as an Alcian fixing bath.

Procion Dyestuffs

The special feature of the Procions is that whereas all other fast dyes rely for their fastness on the deposition of an insoluble dye which is held physically, the Procions react chemically with the fibre—in cellulose, with the hydroxyl groups. The Procion range consists of two series really, the Procion dyes and the Procion H brand dyes. The latter are less reactive, and the significance of this will be seen shortly.

The first point to be noted regarding the printing of Procion dyes, either the Procions or the Procion H brands, is the choice of thickening agents. Most of the conventional thickening agents used in textile printing are chemically related to cellulose, and so would be expected to react with the dye. This does in fact occur, with the result that the thickening is rendered insoluble and is not removed by subsequent wet treatments, and the final prints have a harsher finish. The only thickening recommended for printing Procions on cellulose is sodium alginate; in this country the brand we have used is Manutex RS.

The print paste for development by steaming contains, besides thickening, Procion or Procion H dyestuff, urea as a solvent, sodium bicarbonate which provides alkaline conditions on steaming and an addition of 1% of Resist Salt L as a safeguard against reduction during steaming. The quantities of urea and sodium bicarbonate are dependent on the depth of shade to be printed, and on whether the

* *A paper given to the Manchester Branch, Guild of Calico Printers, Dyers, Bleachers and Finishers Foremen.*

† *I.C.I. Ltd., Dyestuffs Division.*

dyestuffs are Procions or Procion H brands, as follows:—

Using Procion dyestuffs at depths of shade less than 1%:—5% urea, 1% sodium bicarbonate.
Depth of shade 1 - 4%:—10% urea, 1% sodium bicarbonate.
Depth of shade over 4%:—15% urea, 1·25% sodium bicarbonate.
Using H brands—
at depth of shade up to 4%:—10% urea, 1·5% sodium bicarbonate.
at depth of shade over 4%:—15% urea, 1·5% sodium bicarbonate.

The quantity of Resist Salt L is constant.

The steaming time depends on the class of dye—that is whether Procion or Procion H brand is to be printed. If the more reactive Procion is being printed, a steaming time of 2 minutes or even less will give optimum fixation, though longer steaming times which may be necessitated by other dyes present in the pattern, or by the equipment available, are not detrimental. If the less reactive Procion H brands are being printed, a steaming time of at least 5 mins. on cotton, or 10 mins. on viscose rayon is recommended. This is one manifestation of the lower reactivity of the Procion H brands.

Procion dyes, but not Procion H dyes, can be fixed without steaming, the method being as follows:—

The dyestuffs are printed by the recipe already described, nip-padded with or cover printed with a solution containing 20 gm./litre sodium bicarbonate slightly thickened with sodium alginate. Immediately after padding or cover printing, the goods are dried on drying cylinders. Fixation takes place very rapidly, and bleeding either in the padding liquor or on the print is negligible. The goods are rinsed thoroughly preferably in open width, or better still treated at the boil in a solution containing 3 c. cm. Lissapol ND per litre and 2 gm. sodium carbonate per litre. The restriction of this process to the more reactive Procion is another manifestation of their higher reactivity.

Since the Procions and Procion H brands react with the hydroxyl groups in cellulose, they can also react with hydroxyl groups in other substances. We have already considered thickenings, and now we must consider the reaction with water, i.e. hydrolysis. This can occur in the print paste even at room temperatures, which imposes a limit on the print paste stability. This varies with the individual members of the range and the literature quotes as a measure of the stability of a print paste the time taken for the print paste when stored at 15°C. to lose 10% of the printed strength. An examination of the figures quoted shows that the H brands offer a marked advantage in this respect. It is not surprising, since being less reactive they are naturally more stable. For this reason printers generally seem to prefer the H brands.

An important aspect is the reaction with water during steaming. At high temperatures this hydrolysis occurs at a significant rate. The product of hydrolysis is a highly coloured soluble, non-reactive and non-substantive dye. The rate of reaction with cellulose is much higher than with water, but nevertheless an appreciable fraction is hydrolysed. In wet treatments this can stain the wash liquors, and because it is soluble this staining is very noticeable. Quantitatively the fixation achieved is as high as with many of the commonly used vat dyes, but in the case of vat dyes the dyestuff which is not fixed is insoluble and therefore does not colour the wash liquor to anything like the same extent.

Though the inactive dye is not substantive, it is essential to remove it or whites may be stained. In practice it is found that the treatment in open width in hot Lissapol immediately after steaming removes a high proportion of the hydrolysed product, and if this first tank can be either changed when necessary or better still can be an overflow tank, this is the most satisfactory arrangement. There is, of course, no difficulty whatever in processing or washing off lightly covered patterns or patterns printed in light depths of shade. Apart from their use in direct printed styles, Procion dyes can be used in resist and discharge styles and some of these will now be described.

Resists Under Procion Dyestuffs

White resists under Procion dyes are obtained by using resist agent PR which is made into a print paste by stirring with British Gum. Coloured resists can be obtained using vat dyes, the alkali carbonate Formosul recipe being used. After printing, the fabric is dried, nip padded in a slightly thickened solution of Procion dyestuff, dried, steamed up to 8 minutes to fix both classes of dyes, oxidised in dilute potassium or sodium bichromate, rinsed or treated in a boiling solution of Lissapol ND and finally rinsed and dried. In operating this style an addition of 1% of Resist Salt L should be made to the Procion padding liquor in order to prevent halo formation. For the same reason the vat dyestuffs should be printed with the minimum amount of glycerine and Formosul consistent with adequate fixation.

Resists Under Aniline Black

In this style, Procion dyestuff is printed under conditions of higher alkalinity than normal, so as to provide an effective resist for the aniline black. The recipe includes magnesium oxide and anhydrous sodium carbonate in place of the sodium bicarbonate used in normal direct printed styles. This higher alkalinity does reduce the print paste stability. Procion dyes are all capable of reacting with aniline and its salts and it is necessary to ensure that before the aniline black is introduced, reaction with cellulose has already occurred to a considerable extent. When printing Procion dyestuffs, sufficient fixation will have occurred simply on drying after printing. Procion dyestuffs of the H brand series require a short steaming treatment before padding in aniline black.

The printed material, steamed if printed with H brands, is nip padded in Aniline Black liquor and dried. It is then steamed 2 - 3 minutes to develop the Aniline Black and complete fixation of the Procion dyes, and then oxidised in dilute sodium bichromate and acetic acid, rinsed, and then treated at the boil in a solution of Lissapol ND.

Discharging Procion Dyestuffs

Certain Procion dyestuffs may be discharged to a white provided the depth of shade is not too high. Vat illuminated as well as white discharges can be obtained, and this style offers a means of obtaining similar effects to the familiar vat and white discharge on direct grounds, the ground shades in the case of Procions having very much higher fastness than the directs. The fastness in this case is, in fact, comparable with that of the illuminating colours. The white discharge paste consists of gum tragacanth thickening containing Formosul and anthraquinone, brought to the required consistency with water. The quantity of Formosul recommended is 15%, and about 1% of anthraquinone.

Vat Illuminated Discharges

A conventional vat thickening is suitable for this purpose containing as thickening agent British gum with approximately 6% soda ash, 10% Formosul, and 1% ant thraquinone. The use of glycerine is no-recommended since this may lead to haloing. The process is operated as follows.

Pad the ground shade by immersion padding through a solution of dyestuff, urea, sodium bicarbonate, Resist Salt L and Glauber's salt.
Dry in hot air stove.
Print with white or vat colour.
Dry.
Steam 8 mins.
Rinse, oxidise, rinse, soap.

The dyestuffs suitable for use in this process are:—

Procion Brilliant Yellow 6GS.
Procion Brilliant Yellow H5GS.
Procion Yellow HAS.
Procion Brilliant Orange HGRS.
Procion Brilliant Red H7BS.
Procion Brilliant Blue H7GS.

Procion dyes offer the following advantages over earlier classes:—

(1) Ease of fixation—e.g., they are not affected by the quality of the steam as are vats.
(2) Brighter shades than are available from other dyestuff classes of comparable fastness.
(3) Versatility. They can be used in discharge and resist styles, replacing in these styles dyes of inferior shade or fastness.

Turkey: Wool and Wool Tops

L. Kaslowski and Co., Sirkeci, Yah Kösk Caddesi, Muhurdzade Han No. 208/214, Istanbul (Postal Address: P.O. Box 285, Istanbul) would like to represent U.K. exporters of wool and wool tops. The firm say that they wish to import these items against an allocation which has been granted by the I.C.A. for the purchase of wool and wool tops in the E.P.U. area. Payment for goods ordered would be by irrevocable confirmed letter of credit. Established in 1924, they are importers, representatives and commission agents. Exporters interested should write direct, also notify the British Consulate-General, Tepebasi, Beyoglu, Istanbul.

Ceylon: Suitings and Shirtings

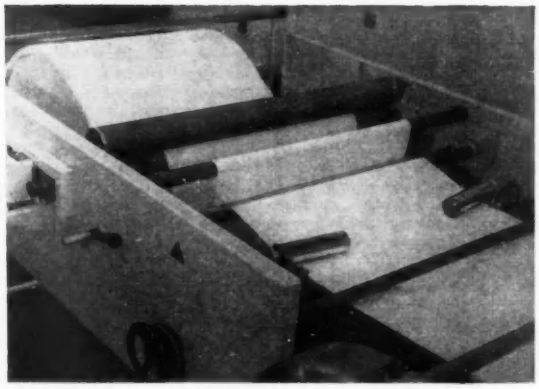
Mr. E. H. Nicholas, P.O. Box 659, 16 Gaffoor Building, Colombo, wants to represent U.K. manufacturers of 54 ins. spun rayon, etc. suitings and good quality shirtings. Established in 1946, he handles towels, knitting wool, hosiery and cotton goods, and covers the whole of Ceylon with five travellers.

Manufacturers interested should write direct, also notify the U.K. Trade Commissioner, 2nd Floor, Hong Kong Bank Building, P.O. Box 745, Colombo.

Automatic Screen Printing

The working parts of the squeegees on this machine consist of flexible rubber strip mounted on the stainless bodies. Adjusting nuts at the sides enables the squeegees to be raised vertically, thus bending the rubber blades more or less as desired

ON the fully mechanised screen printing machine made by Gebr. Stork and Co.'s Apparatenfabriek, N.V., Amsterdam, the cloth feeding arrangement ensures the cloth is fed at constant tension so that the device consists of an electrically-driven pair of nip-rollers with intermittent action which pull a definite length of cloth off the roll into a scray balanced to operate a micro-switch. When the reserve of cloth reaches an adjustable minimum, the scray lifts and pushes the switch. When the cloth is sufficient again the scray lowers and the motor is switched-off. A pair of expanders with selvedge guiders which can be adjusted to all widths up to 55 or 65 ins. ensure an even feed of cloth into the machine.



Arrangement to ensure even feeding of the cloth

The printing unit is a heavy steel frame with cross-bars, on which the printing table is mounted. The multi-plywood table is non-warping and an endless conveyor belt runs over the table. The use of three pre-stretched layers of fabric vulcanized on top of one another ensures good stability of the rubber cover, and the tension in the belt is controlled by an adjustable device mounted beneath the printing table; an adjustable roller also ensures high-precision, positive guiding of the belt. The steering roller is connected with a servo-motor and the slightest sideways movement is corrected immediately. The repeat roller is driven by a rack and pinion with ground teeth. Claimed to have an accuracy of 0·004 in. (0,1 mm.) the repeat is infinitely adjustable between 10 and 40 ins.

Alongside the printing table are the main screen carrier, squeegee carrier, and lifting arrangement for screen and squeegees protected by a stainless steel cover. The printing screens are secured to the main screen frame by adjustable blocks with butterfly nuts to facilitate rapid mounting and dismantling. The screen adjusting blocks have fine set-screws for precise registering of the printing screens.

One feature to which the makers draw particular attention is the design of the squeegees. The working part of the squeegee is a flexible rubberstrip mounted in a sturdy stainless body and by adjusting the nuts on either side the squeegee can be adjusted vertically, thus bending the rubber more or less as desired. Deeper the squeegee setting and smaller the angle between the squeegee rubber and screen, and greater is the penetration obtained. This new squeegee is said to eliminate any necessity to give more strokes in cases where more penetration is needed, and even terry towelling, plushes and similar type fabrics can be satisfactorily printed with only one stroke.

The advantages cited for this new squeegee design are:—

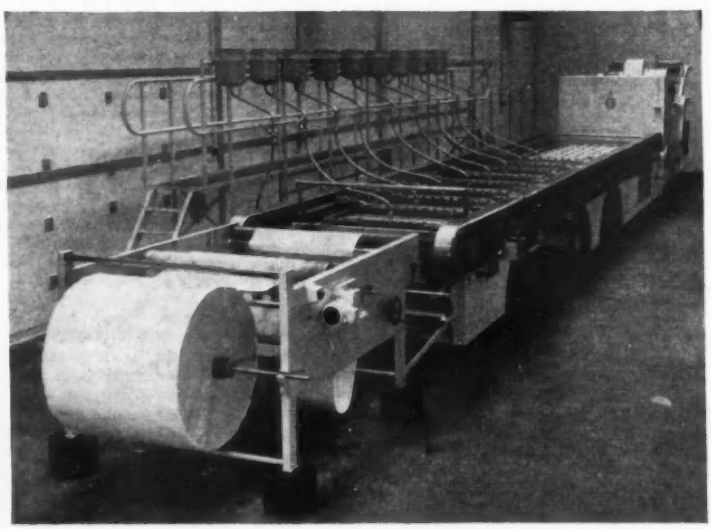
(1) Adjustable penetration without any loss of production capacity.

(2) The amount of "surface colour" is reduced to a minimum so that very sharp and even prints on light and heavy fabrics are easily obtainable.

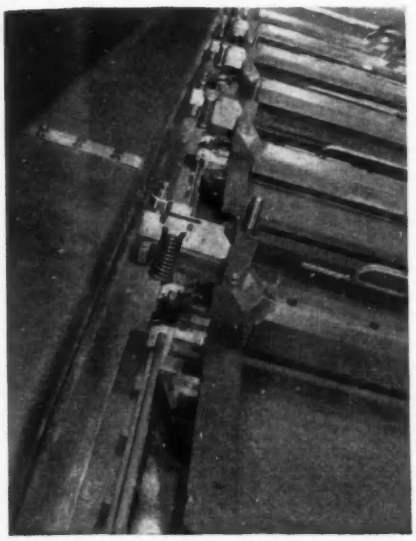
(3) Extremely little wear on the screens. It is stated that British users of the machine claim that already the machine have printed 160,000 yds. with one set of screens.

(4) The design of the printing is simple. All squeegees can move simultaneously over the screens, thus eliminating separate squeegee motors.

In operation, the cloth is fixed to the conveyor belt with a water soluble adhesive.

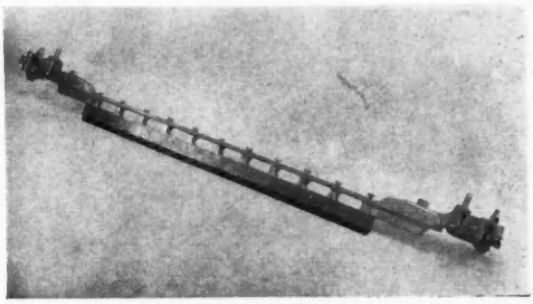


View end to end of the fully mechanised printer



(left) Adjustment for the squeegees

(right) The squeegee removed from the machine



The adhesive is applied from a container mounted on the platform and the feed is controlled mechanically. The actual process consists of (*a*) the forward motion of the conveyor belt with the attached cloth over one repeat and (*b*) the stroke of the squeegees, and the lifting and lowering of screens and squeegees. These motions are initiated by a switch gearing which is mounted on the frame of the machine and is driven by a single motor.

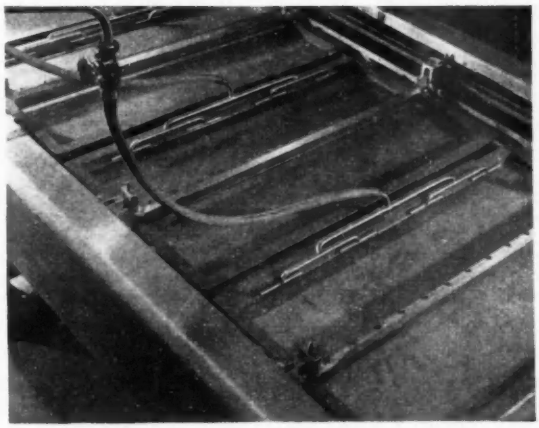
The print paste is fed to the screens through paste dispensers, attached to a steel fitting on the printing frame. This ensures an unvarying continuous feed of print paste across the whole width of the screens. The print pastes are contained in 35-pint containers of stainless steel arranged on the platform running along the side of the machine. The feed of print paste to the screens can be controlled in accordance with the consumption of dyestuff by manual operation of the individual cocks provided with rubber valves.

The printed cloth is stripped from the rubber blanket and fed into the drying chamber by a transporting roller arranged in the drying chamber and driven by an electric motor with friction clutch and chain drive. The passage of the cloth into the drying chamber is specially arranged to eliminate all danger of marking-off. The drying chamber is heated with steam and a fan provides uniform air circulation. After the drying, the cloth is cuttled or batched.

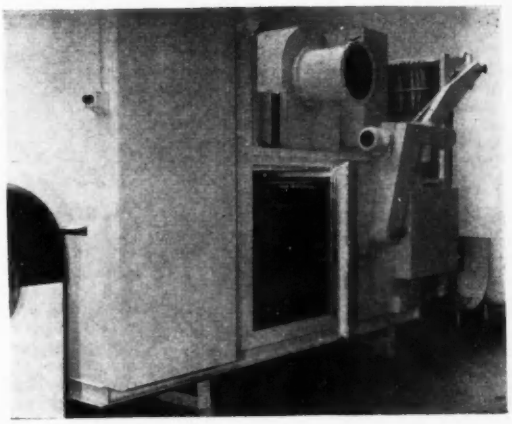
The conveyor belt, from which the printed cloth has now been stripped, passes through a continuously operating washing unit on its way back to the feeding device. This washing unit operates on a spraying and centrifuging principle, without the use of rotating brush rollers. The whole range is equipped with five motors for driving the feeding device, the belt washing apparatus, the printing unit, the dryer fan, and the transport roller inside the dryer together with the cuttling mechanism, respectively.

Stork machines are made for a maximum printing width of 51 or 65 ins. and for a maximum of 13 colours.

To prepare the whole machine for a certain repeat is about 4 - 5 mins. and the time needed to change a screen with squeegee and colour distributors is about 2 - 3 mins. if spare colour distributors are available.



Method of feeding print paste to the screens



The drying chamber

SKINNER'S HOSIERY AND KNIT GOODS DIRECTORY, 1958. Thomas Skinner and Co. (Publishers) Ltd., 44 Brazennose Street, Manchester 2 (price 40s.).

A feature of the past year has been the expanding popularity of knitted outerwear, a development which has led to many new producers being added to this already comprehensive directory. Details are given of over 3,000 firms engaged in hosiery, knitwear and lace manufacture and the ancillary industries. The four principal sections of the directory are the manufacturers' section covering not only manufacturers but also dyers and finishers distributors and shipping houses; the buyers' guide which classifies under 220 headings makers and distributors of the industries' products; a trade marks' section containing some 2,500 trade names; and classified lists of mill supplies and services. All the firms mentioned in the directory are given in an index near the front of the volume.

VIBRATION AND SHOCK ISOLATION. Some of their wide range of isolating equipment is shown in a well produced booklet (No. 957) available from W. Christy and Grey Ltd., 4 Lloyds Avenue, London, E.C.3. A valuable article on the fundamental theory of vibration isolation is followed by illustrated descriptions and specifications of steel spring unit mountings, rubber unit mountings, rubber carpet mountings, "Coresil" and "Corpol" natural cork plates, cork/rubber plates, felt plates, agglomerated cork plates, etc., steel spring suspension systems and viscous dampers. A considerable amount of valuable information is given in this publication.

Society of Dyers and Colourists

Application of Amino Resin Finishes to Cotton

IN a recent lecture to the Midlands Section of the Society of Dyers and Colourists, Mr. A. R. Smith, B.A., B.Sc., F.R.I.C. (British Industrial Plastics Ltd.) discussed the following uses of amino resin precondensates for cotton treatment:—

(1) Normal crease-resistant finishes.
(2) "Minimum iron" finishes—a recent development of (1).
(3) Dimensionally stable fabrics.
(4) Durable mechanical finishes.

The best product for one application might not prove satisfactory in another, he said, although all produced crease resistant, dimensionally stable and durable mechanical finishes to some degree. Generally speaking, the tensile and tear strengths of a treated cotton fabric would be found lower than the untreated; the strength loss depended on fabric construction and choice of a suitable fabric helped in this respect.

Discussing the effects of various factors on results obtained, Mr. Smith said that a precondensate capable of penetrating the amorphous regions of the cellulose should be used, but a higher degree of condensation was permissible for cotton than for rayon. The crease recovery of a fabric increased with resin content until a certain concentration was reached, after which a limiting value was approached. The crease-recovery imparted to a given fabric was proportional to the drop in tensile or tear strength produced, while the quantity of precondensate required to produce a given crease recovery varied according to the U/F ratio and differed noticeably for U/F, M/F and ethylene-urea formaldehyde precondensates, ethylene-urea products being most efficient followed by U/F (a : 1·9), M/F (1 : 3·3) and U/F (1 : 1·5) in descending order.

Washing off after resin treatment was recommended to remove by-products of the reaction and improved tear strength and reduced tensile strength compared with unwashed fabric. Mercerisation could improve crease-recovery at higher resin concentrations with less strength loss. Polyvinyl alcohol usually improved tensile strength but reduced tear strength. Rubber-like polymers might improve crease-recovery.

Crease-Proofing

Mr. Smith said certain types of precondensates were more effective crease-proofing agents for cotton and the appropriate product must be chosen for the purpose in mind. Urea-formaldehyde precondensates gave excellent crease-recovery whether methylated, modified in other ways, or unmodified. The degree of durability demanded of the finish might be greater for "minimum iron" particularly in the case of shirtings and an improvement might be obtained by using an ethylene-urea formaldehyde precondensate. The "non-chlorine-retentive" properties of the finish would also be improved in this way.

Dimensional Stabilisation and Mechanical Finishing

Mr. Smith felt these processes should be considered together since in both cases the swelling of the cellulose in aqueous alkaline solutions should be reduced or prevented. This effect usually followed from the normal crease-resisting treatment and resins of the same type were employed for both crease-resisting and mechanical finishing. The same mechanism might not be involved, however, and cross-linking of cellulose, although the principal requirement in the production of crease-resistant fabrics, might not be necessary for dimensional stabilisation.

Chlorine Retention

The use of hypochlorite bleaches resulted in the retention of chlorine by amino-resins due to reaction with free-NH groups and interest in "non-chlorine-retentive" finishes had recently increased, said Mr. Smith. Melamine resins usually retained chlorine with yellowing of the treated fabric. Urea resins also retained chlorine, but the reaction product was colourless and no visible change in the fabric took place. On ironing the chlorine-treated fabric, however, liberation of hydrochloric acid occurred with urea resins and tendering of the fabric ensued. In the case of malamine resins, the yellow produce was relatively stable and little acid tendering occurred.

It had been suggested recently that finishes based on dimethylol ethylene-urea, although having no free-NH groups and therefore "non-chlorine-retentive" when applied, might not retain this property after repeated alkaline washes. This matter was under investigation, but it was likely that if curing had been incomplete and free methylol groups remained in the system, these could be removed under alkaline conditions and the fabric might then become "chlorine-retentive." Excellent "non-chlorine-retentive" finishes were undoubtedly obtainable by careful choice of accelerator and curing conditions, while alternative resins whether nitrogenous or not were less effective crease-proofing agents than dimethylol ethylene-urea.

Speaking of treatment of knitted fabrics Mr. Smith observed that dimensional stabilisation of knitted cellulose fabrics was an obvious application for amino resins and excellent results could be achieved experimentally. In practice, however, the handling of the fabric presented some difficulty and the quantity processed was consequently small. Tensile and tear tests were unsatisfactory for such fabrics and a bursting test probably gave a better assessment of the strength loss due to resin treatment.

Society of Dyers and Colourists

Organic Pigments

ORGANIC dye output in the U.S. in 1956 reached the rate of 167·5 million pounds a year whereas pigment makers were producing at the rate of 44·5 million pounds a year. The dye figure would contain approximately 36 million pounds of vat pastes containing perhaps an average of 10% actual vat colour and the pigments include some reduced colours so that the final ratio would be roughly 135 : 43 or, very approximately, 1 lb., of pigment to every 3 lb., of dyestuff, observed Dr. F. M. Smith (Geigy Co. Ltd.) in a recent address to the Bradford Junior Branch of the Society of Dyers and Colourists. From these figures, it would be apparent, he said, that pigments could hardly be regarded as the Cinderella of the colour industry. In the case of pigments—unlike dyestuffs—there were far fewer chemically different types, so that on total production of individual dyestuffs and pigments, pigments could be very well represented on the top of the list, the weights of individual colours being remarkably high.

The principle characteristic of a pigment as opposed to a dye was that it was insoluble in the medium in which it was used, Dr. Smith went on. Its physical properties were of great significance and furthermore it was not applied by a process involving solution. Amongst the first synthetic pigments were lakes of madder and alizarin and a limited number of lakes—including madder lake—was still manufactured and used to this day. Various synthetic dyestuffs—acid or direct—were usually laked with barium chloride on to precipitated alumina or on to an alumina/barium sulphate co-precipitate.

The main component, by weight, of a lake was inorganic. Mentioning the natural and synthetic inorganic pigments, Dr. Smith said that their important features were their inertness and excellent light fastness but there were extremely few which were completely inert and most of them were dull in shade and low in tinctorial strength.

Organic pigments on the other hand were tinctorially strong and bright in shade. The first 100% synthetic organic pigments as opposed to lakes, were used to shade or tone the weaker colours, hence the name "toners." This name had stuck and in some circles it now had a special meaning, covering the metal salts of sparingly

The Conquest of Friction

A great stone weighing 1500 tons had to be transported in 1770 to a park in St. Petersburg to serve as a base for a statue to the founder of the city. The task was entrusted to a Greek engineer, Carburis, who devised grooved rails made of copper in which moved copper balls; a similar grooved rail was inverted over the balls to form the upper race on which the load was carried. Balls which became damaged during the progress were reshaped by smiths at a forge set up on the stone itself.

Although the same principle has been used in recent years, the days of repairing damaged bearings on the site have long since passed. Today, the high-quality of SKF products, backed by expert technical advice in their use, ensures that every SKF bearing is exactly right for the job for which it is intended.

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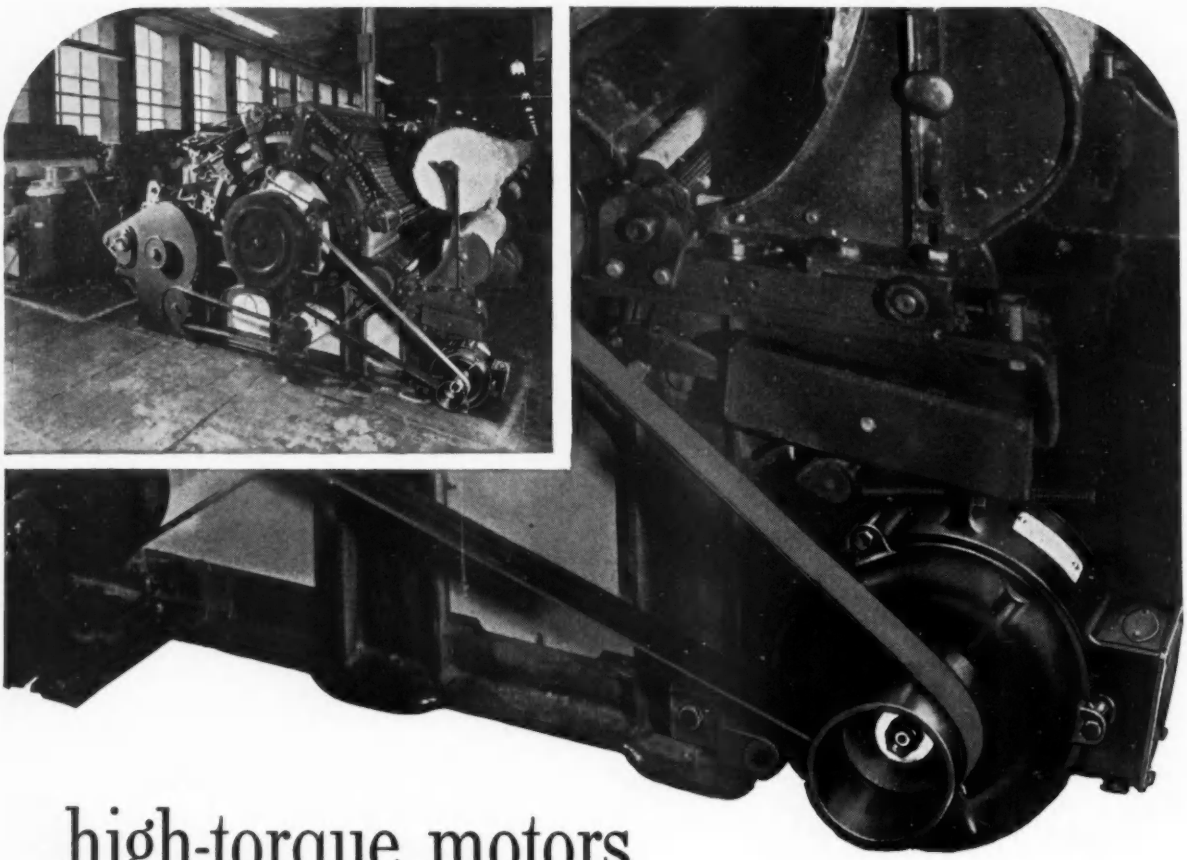

high-torque motors for carding engine drives

Built to work 24 hours a day for two years continuously without attention, the 'ENGLISH ELECTRIC' 1½ h.p. 960 r.p.m. high-torque, squirrel cage motor has been specially designed for cotton carding engines. Temperature rise will not exceed 35°C. even with frequent starting and the heavy inertia loading of this type of drive.

'ENGLISH ELECTRIC' LNL carding engine motors, already fitted by leading manufacturers, comply with B.S. specification 2613:1955. They are lug-mounting for easy fitting and tensioning and the prepacked bearings are housed in dust-tight chambers thereby dispensing with lubricators.

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soluble dyestuffs not made on a substratum.

The introduction of a sulphonic acid group and subsequent laking with a heavy metal was one of the most useful ways of imparting oil insolubility, solvent and often heat resistance into simple organic molecules. An appreciable increase in brightness of all toners was produced by the incorporation of up to 25% resin as sodium rosinate the Na salt of the dye prior to addition of the laking metal.

The value of a pigment, Dr. Smith observed, depended on its unique combination of properties in relation to a particular use. Increase in molecular weight tended to reduce bleeding in solvents and resins and the preparation of the well-known azoics in pigmentary form gave a range of pigments selected also for good light fastness. There was still activity in this field, the emphasis being on still larger molecules. Both Bayer and Ciba had been active recently in this field.

Surprisingly, permanent pigments could also be prepared from basic dyes by the use of complex acids as precipitants. The commercially important were phosphomolybdic acid and phosphomolybdotungstic acid. In the preparation of a dyestuff it was important to take the desired reaction to completion. In the case of pigments, however, the desired reaction must not only be taken to completion but the physical form in which the colour was precipitated initially was vitally important. The reason was that no further essential change did or could be permitted to take place during subsequent isolation and incorporation in the medium which it would colour. The physical form of the powder produced thus had a fundamental influence on the final appearance and introduced a large number of attributes or features in the pigment which must be accurately controlled.

Dr. Smith went on to deal with the development of the phthalocyanines, after which he spoke of the pigments derived from vat dyestuffs. A small range was now available and one or two were outstandingly good. Indanthrene Blue had been used for many years due to its very high light fastness although its shade was somewhat dull. A newer introduction had been a carbazole dioxazine violet which was based on a vat colour intermediate. This gave very bright shades and filled a gap in the pigmentary colour range of shades which had been wanted for some time.

In textile printing the share between pigments and dyes seemed to be variable from one country to another but it was doubtful if the pigments took more than 50%. They did, however, replace some of the more expensive dyes and were particularly useful for padding solid shades on mixed fibres where difficulties were encountered with dyestuffs due to differing affinities of the fibres.

One of the main difficulties, Dr. Smith observed, was that in order to maintain the good handle of the fabric often sufficient resin binder could not be used to give complete protection to washing or to dry cleaning and it was generally considered that there would be a fierce battle between dyestuffs and pigments during the next five years.

Pigments were being used extensively for mass dyeing of the man-made fibres. The largest quantity used was in the spin dyeing of viscose rayon where very finely dispersed pigments in aqueous suspension were made into a master batch with viscose solution and injected into the main viscose supply before spinning. Obviously, pigment particle size had to be extremely small in order to avoid blocking the very fine holes in the spinneret otherwise repeated breakages in the yarn occurred. Manufacturers of these pigment dispersions were now able to produce dispersions in which practically all the particles were below 1 micron in size and none was greater than 2 microns, and this was leading to much improved and trouble-free spinning.

The pigments which were used had to be carefully selected in order to obtain the necessary fastness to the processing operations of the viscose itself—alkali, acid, desulphurizing—as well as subsequent processing of the fabric, including dry-cleaning. Pigments were carefully selected on the count of light fastness since some were outstandingly good in viscose and remarkably poor in other applications and conversely. It was at one time considered that very large yardages must be run before the method could be considered economical but this lack of flexibility now appeared to be no great obstacle. Obvious advantages were cheaper processing by comparison with dyeing, better fastness properties and brighter shades.

Acetate rayon could also be mass dyed very readily by the use of pigments, the pigment being incorporated in the form of cellulose acetate chips, or, in some cases, being added as an aqueous dispersion. Non-bleeding in the solvents used was, of course, essential. Spin dyeing of the newer synthetics was more difficult since more powerful solvents and higher temperatures were often necessary. The high temperatures involved in melt-spinning of nylon, etc., were such that very few organic pigments could be used, phthalocyanines and vats being the most likely.

Society of Dyers and Colourists

More Efficient Mangling

RESULTS of a large number of tests over the last few years had shown that many textile works mangles were less efficient in removing water and had less uniform nips than they should have. The commonest cause of inefficiency was the use of low loads (possibly out of fear of the effects of deflection on uniformity, and possibly to reduce wear and tear on the mangles and bowls), but many finishers did not realise the cost in lowered production and increased energy in subsequent thermal drying which had to be set against this.

This information was given by Mr. E. Moss, B.Sc., A.R.I.C., in a recent address to the junior branch of the Society of Dyers and Colourists at Manchester College of Technology. Explaining that the literature on mangling was sparse and often confused, he said he proposed to deal largely with work conducted in the laboratories of the British Cotton Industry Research Association for some years.

Two approaches to the subject had been made, one fundamental, one practical. In the more fundamental one an attempt had been made to discover exactly what went on in a mangle nip. This had involved measurements of the variation of pressure on a fabric passing through calender and mangle nips, and a theory of mangling was being developed in which the liquor retention after nipping is related to the load and speed, the bowl characteristics and the properties of the liquor.

The more practical approach had begun with a study of squeeze mangling because of the importance in drying of efficient removal of water by mechanical means before the much more expensive final drying by heat. In these experiments it had been shown that the effects of load, bowl diameter and bowl hardness on water retention could be expressed in terms of the mean pressure in the nip. Speed had only a small effect, whilst temperature had the largest effect of all on water retention. For example, an increase in the temperature of squeeze mangling from 5 to 65°C. could reduce the amount of water to be removed from a cotton cloth during thermal drying by 20%.

Among methods of assessing the uniformity of mangle nips which the lecturer described was the recording of the area of contact in the nip by means of carbon paper. This had shown that the biggest single cause of uneven nip was deflection of the bowls due to the load being applied at the extremities. A simple instrument designed to measure the deflection of a bowl under load was the "Shirley" bowl deflection indicator. Whilst this did *not* measure the camber on a bowl, it did indicate the amount of surface camber required to give a uniformly loaded nip at a particular applied load.

An alternative method, namely the cambering of the underlying mandrel of a rubber-covered bowl to correct for deflection, possessed several advantages over surface cambering, Mr. Moss explained. The amount of camber required to correct for deflection was often considerable, particularly with filled bowls (e.g. of the wood-fibre type) since their resistance to deflection depended almost entirely on the central shaft, the filling contributing little if anything, to the rigidity of the bowl. If no correction for deflection of the bowls was applied an increase in the load on the journals could sometimes lead to an increase in water retention.

Softness of the rubber cover was another frequent cause of inefficiency on water expression by mangles with rubber-covered bowls, Mr. Moss explained. Here, however, the use of the mangle for other purposes, such as padding, or filling sometimes necessitated the employment of covers softer than were required for efficient water removal. Also the effect of deflection on nip uniformity was more pronounced with hard than with soft rubber covers.

Thread-guide wear in the manufacture of synthetics countered by SINTOX

With the rapid advancement of man-made fibres since the war it became obvious that a far better thread guide material would have to be found, with exceptional qualities of surface smoothness, strength and chemical resistance, and in particular, resistance to abrasion.

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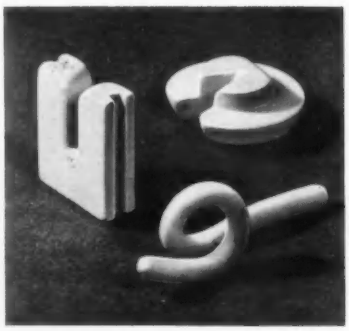
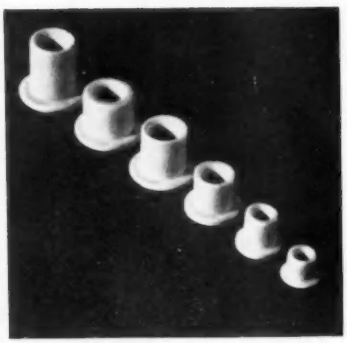


complete success where other materials would wear or break. Its normal velvet finish is so



smooth that thread damage is avoided, and the very low co-efficient of friction eliminates tensioning problems.

For several years now SINTOX thread guides have been available to textile manufacturers for use where *very severe* wear problems arise. Unfortunately their expense has precluded more general use in the industry. This has been due to the elaborate and exacting process of manufacture, with high standards of quality control and inspection, coupled with the diversity of thread guide which we have produced.

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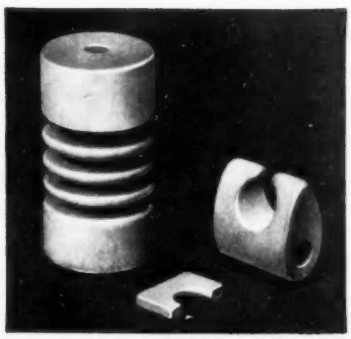

Shrinkage in Laundering

WITH the advent of compressive shrinkage there was a tendency to think that the shrinkage problem was solved and that garments made from pre-shrunk fabric would retain their size on repeated laundering but this did not prove to be the case, said F. R. Hill, B.Sc., A.R.I.C., A.T.I. (deputy director British Launderers' Research Association) in a recent address to Scottish Junior Section of the Society of Dyers and Colourists. Although both processes effected pre-shrinking to give a residual shrinkage of 1%, this did not mean that the cloths would not shrink more than 1% on repeated washing. The limit of 1% residual shrinkage referred to 1% shrinkage when the cloth was tested in accordance with the standard test procedure. However efficiently the pre-shrinking process might be carried out, trouble was still possible in the made-up garment. For example, with the neckband of a shirt or collar, shrinkage could still arise through stretching of the pre-shrunk fabric in making up, by using unshrunk interlining, or from seam shrinkage. Makers-up had, in fact, found that the pre-shrunk fabric was rather more difficult to handle than unshrunk cloth and although progress had been made in the intervening years in coping with such problems shrinkage complaints still arose although it was difficult to assess their actual extent.

The problem was generally recognised as requiring further investigation and the most recent work had been that conducted by Shirley Institute following a conference of interested bodies. Shirley Institute Pamphlet No. 68 presented their findings, which indicated that all concerned in the production and laundering of garments might contribute to the occurrence of shrinkage, thus largely confirming the views held by one or other section of the textile industry, including laundering and dry cleaning, in the light of their previous experience.

From the launderer's point of view, continued Mr. Hill, several aspects were of importance, viz., progressive shrinkage, seam shrinkage and the effect of various ironing processes. There were other important factors, of course, but these could not be covered in an evening, he said. It had long been known that progressive shrinkage occurred on repeated wet treatment of cotton cloths. For example, Collins dealt with the subject in his paper published in the Journal of the Textile Institute for 1939. Such shrinkage was often overlooked probably because it did not affect some cloths as seriously as others.

Local shrinkage at the seams of garments was fairly common and might be due to a number of causes such as stretching of the cloth in sewing, the characteristics of the sewing thread and the standard of sewing machine maintenance. The Shirley Institute pamphlet provided some information on this point. Progressive shrinkage was apparent over the series of washes but in addition it was apparent that the seams had suffered more shrinkage than the cloth itself. It was apparent that:—

(1) That shrinkage difference decreased on repeated laundering.
(2) The waist to neck seam shrank about 1% more than the leg seam. This effect was a common experience usually attributable to the fact that it was easier to straighten some seams than others when laying out a garment for pressing.

It was well known that the dimensions of some cloths could be appreciably changed by varying the method of ironing and it is for this reason that press finishing was employed in shrinkage testing for it did not involve any stretching action which, if applied, would be difficult to standardise. It also happened that pressing was a very common commercial laundry method of ironing. It was sometimes suggested that cloth should be pre-shrunk sufficiently to allow for progressive shrinkage, but this was not practicable for the cloth would be unstable; it would be extensible so that trouble would be experienced in making-up.

The application of crease-resistant finishes imparted some dimensional stability to cloths so long as they were laundered under conditions which did not lead to a loss of the finish. This was a hopeful line of approach to the elimination of the shrinkage problem, at least with some types of cloth, and a fairly satisfactory performance had been obtained recently in tests on furnishing cloths.

Turning to wool cloths, Mr. Hill said it need hardly be said that these suffered shrinkage in much the same way as cotton cloths but with the additional complication of felting shrinkage. Shrinkage due to the release of strains, usually referred to as relaxation shrinkage, was not the launderer's responsibility but felting shrinkage might be largely within his control. Many processes had been proposed and operated for imparting resistance to felting at some stage in the production of wool cloths. The majority depended on effecting chemical modification of the surface of the wool fibre but some were based on resin impregnation. It was seldom that these so-called shrink resisting finishes were applied to an extent which would impart complete resistance to felting so that all woollens needed to be treated with respect in laundering. In any case, the launderer would not necessarily know which garments or articles had been given a shrink-resistant finish.

As with cotton, there were some quaint ideas as to the cause of felting in washing. Mr. Hill said he had often heard of felting being attributed by retailers and even by manufacturers to the laundries' use of "strong detergents" or to the garment having been boiled. It was true that felting was influenced by the alkalinity of the wash liquor, although in general the greater the alkalinity of the wash liquor, the less the felting, but in practice felting was due almost entirely to one cause—the amount of movement and rubbing when in a damp or wet condition. It was important, therefore, in laundering to reduce movement to the minimum. Laundering processes were designed with this in mind. In rotary machines the amount of movement was restricted by such means as the use of high washing and rinsing dips and by interruption of the motion of the machine. These were well tried processes for use in such washing machines and whilst suitable for a substantial proportion of woollen goods they would give rise to excessive felting in some woollens. This was only to be expected for wool cloths varied both in respect of relaxation shrinkage and their susceptibility to felting. Generally speaking, the lighter and the more open the construction no matter whether woven or knitted, the greater was the liability to felting.

In washing woollens the problem before the launderer was classification. He must ensure that only those articles suitable for machine washing were so washed and that the more sensitive fabrics were washed carefully by hand. This was by no means always easy for apparently similar articles might differ appreciably in behaviour and mistakes inevitably happened from time to time. It was, of course, a matter of experience on the part of the sorters or classifiers.

The tendency to felt was not confined to woollen goods for rayon could suffer a similar form of damage. It was most commonly experienced with spun rayon twill weave tablecloths. From the many examples seen it occurred most frequently in cloths where there was a change in the direction of the twill part way across the width and sometimes part way along the length, the felting being confined to diagonally opposite areas where a particular combination of yarn twist and direction of twill obtained. It also arose with some fancy weaves. The rayon fibres in the spun yarns became damaged with the production of "barbs" which clearly promoted the felting action. The felting usually arose when it was found necessary to employ a fairly vigorous washing process in order to effect adequate cleansing and in this connection it should be borne in mind that cloths of this type were frequently heavily soiled in use. It could also occur even under mild conditions of washing and with filament rayon cloths, especially those in which the weave included long floats. This particular result of the interaction of yarn twist and direction of twill was investigated by Backer, Zimmerman and Best-Gordon and was reported in "Textile Research Journal," February 1956.

With rayon cloths there was, of course, the possibility of relaxation shrinkage as with cotton and wool cloths, but with some of them there was the additional possibility of felting shrinkage. It was primarily a matter of cloth design for constructions could be used which were not favourable to felting. There was, however, a kind of intermediate stage between relaxation and felting where shrinkage was brought about by distortion. This was found in heavy rayon furnishings of soft construction and usually twill weave. To wash these by a machine process was

(*continued on page 374*)

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Auxiliary Products in the Finishing Trade*

The finisher is continually being called upon to produce special finishes to provide increased sales appeal to existing fabrics and the wide range of auxiliary products now available helps considerably in most of the finishes demanded

By G. V. W. KENDELL†

CREASE resist finishes are very popular at the moment and whilst at first confined chiefly to spun rayon the demand for crease recovery has now been extended to cotton and linen. Finishes on cotton include the more recent "drip-dry" and "non-iron" finish. In practically all cases the improved recovery from creasing is achieved by using a compound made from urea and formaldehyde. These are simple products but when dissolved together to make a very concentrated solution have the property of combining together. At first the molecules of the compound which is formed are sufficiently small to remain dissolved in water and also to penetrate into certain parts of the viscose or cotton fibres.

If the concentrated solution is kept too long the molecules continue to grow to such a size that while still in solution they have not the power of penetrating inside the fibres, and simply form a coating on the surface of the cloth giving a stiffening effect but no great power of giving crease recovery. If the urea formaldehyde resin is used when it is in the right condition and the cloth is then dried the molecules can be made to grow by baking in the presence of either an acid or something which liberates acid on heating. Once the large molecules are formed within the fibres they are not easily removed by washing. It is important not only that the urea formaldehyde resin solution should be in the right state but that it should not be made to migrate to the outside of the fibre during drying, by incorrect heating.

The resins used are either made by the finisher or are supplied, ready to be dissolved or diluted, by manufacturers of auxiliary products. The amount of resin usually found in cotton is 6–8%, filament rayon 10–15%, and spun rayon 10–25%. When this high resin content is met it can be assumed that it is there to give fullness and to try and achieve maximum crease recovery. Overloading fabrics with resin has the effect of reducing the wearing properties.

A number of auxiliary products are used either with the resin or as an aftertreatment according to the special requirements. Sometimes the merchant demands a soft handle in which case a softener is included. Sometimes he wants it fuller or firmer than can be obtained with a resin, and then a stiffening agent is employed; these can be of the PVA or acrylic type. The softening agents used may be cationic, anionic or nonionic, and are quite commonly applied in the crease resist bath. They become trapped in the resin bath and are not easily removed in subsequent washing.

There is a big difference in the quality of the crease resist finish which can be obtained when the resin is thoroughly saturated into the fibre in one case and only superficially picked up in the other, and for this reason it is common to use a wetting agent in the bath. In addition, relatively long immersion is recommended, but if a crease resist and waterproof finish is being applied the wetting agent should be omitted. If a cationic softener is used the wetting agent must be nonionic or cationic. Similarly if an anionic softener is used a cationic wetting agent must not be employed, because of mutual precipitation.

Typical softening agents are Ceranine HC 39, which is cationic, Ceranine FE which is anionic, and Sandozin W which is nonionic. Wetting agents are Resoline NW which is anionic, and Sandozin NI which is nonionic. The latter also has the property of prolonging the life of the crease resist bath which in time becomes unusable, due to the growth in size of the resin molecules. One point about softening agents is that the best one for crease resist work is not necessarily the best for dimensional stability work.

Sometimes there is a demand for a combined crease and water-repellent finish. One of the best ways is to use a product of the Cerol WB type in the crease resist bath. It condenses along with the resin, giving water repellency and a soft handle, without interfering with the crease recovery. It is dangerous to use a paraffin wax emulsion containing aluminium formate, etc., in the crease resist finish. A good water-repellent finish can be obtained in this way but within a very short time there is a likelihood that fishy smells will develop. An aftertreatment with this type of proofing agent, which includes Cerol T, etc., is sometimes successfully carried out, without any development of fishy smells.

There is no reason why a good spun viscose cloth should have bad wearing properties. The whole problem has emphasised the difference between softening and lubrication, and it does not follow that the best softener is the best fibre lubricant, e.g. Ceranine HC 39 or Ceranine HCS are excellent softening agents but do not give the best possible fibre lubrication. Finish WT, is however a first-class lubricant with only moderate softening power, and can substantially improve the duty factor of crease resisted spun rayons. Finish WT is also useful for improving the finish of crease resisted cottons as it reduces the likelihood of embrittlement.

The principle we have followed is to use an amount of crease resist resin to give reasonable crease recovery, to give additional body and fullness with one of the Solvitose brands, and to give fibre lubrication with Finish WT as a protection against the abrasive properties of the minute crystals of resin. This type of fibre lubricant is also of great value for improving the stitching properties of fabrics. A sewing machine can run at 4,000–5,000 stitches/min., and overheated needles may do a lot of damage, but if the fibre is well lubricated the damage can be kept to a minimum.

The amount of resin used in cotton is less than in rayon because there is not as much room in cotton fibres as in rayon. Formation of resin outside the fibre can be dangerous and the cotton becomes embrittled although, when the resin is removed, the cotton is undamaged. Just as the resin has the property of binding a softening agent, so it can bind a stiffener, and to obtain stiff finishes a number of products can be used. Emulsions of the polyvinyl acetate, polyvinyl chloride or acrylic resins are employed along with the crease resist resin, sometimes together with starch. There is a lot to be said for applying the starch first, drying the fabric, and then using the resin finish on top.

Other types of permanent finishes are produced with melamine or urea formaldehyde resins and mechanical means. These include schreiner, embossed, chintz, and permanent pleating. In transforming the fabric a fast to washing finish is obtained. Technically all the finishes mentioned are applied on the same lines. The cloth is padded in a synthetic resin bath,

* *A recent paper to the Guild of Calico Printers at Radcliffe.*

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dried and subjected to mechanical treatment. As in crease resist finishes it is advisable to use a nonionic wetting agent, thorough wetting being essential, for the fabric runs through the bath rather quickly. Correct moisture content, calender pressure, and temperature are necessary to obtain the best results.

The schreiner finish is commonly produced on a cotton or viscose weft satin, calendered with diagonally engraved rollers. Other cloth constructions can be used to vary the effect and the cloth is usually mercerised before applying this finish. A schreiner finish gives a silky appearance to the fabric and also greatly improves the draping quality. Chintz effects are obtained on a friction calender, giving one or more passages, between steel and cotton or paper-covered bowls. The steel bowl has a temperature of 150–190°C. Cloth used for this type of finish is the densely woven, smooth surfaced and evenly spun type. Embossed effects are produced on rayon and cotton with small asymmetrical designs.

Raising

Raising the cloth in the wet state is still practised in the woollen trade and vegetable teazles are still employed but when raising is mentioned most people think of barrel raising machines fitted with little bent steel hooks. One set of teeth stretches the cloth to prepare it and the next set digs in and lifts some of the fibres. The aim is to lift one end of a fibre free without disturbing the grip of the other and without breaking any fibres. The secret here is lubrication. The lower the coefficient of friction of the fibre the quicker, fuller and more even is the raising.

Every lubricant has its limit as far as coefficient of friction goes, and increasing the amount of lubricant beyond that point does not increase the lubrication, e.g. one can put pounds of soap into a cloth and it will not give as low a frictional figure as the right amount of wax, so the raiser asks the bleacher to be gentle with the kier boiling, to leave all the wax in the cloth he can, but on the other hand the dyer tells the bleacher he wants the cloth clean and so does the merchant. This is not easy without thorough kier boiling as all sorts of rubbish seem to get into the weft yarns for the raising trade. The way out of the difficulty is thorough kier boiling and then an aftertreatment with a suitable wax emulsion of very fine particle size.

In knife raising—used for the medical lint trade—a knife oscillates forwards and backwards across the width of the cloth which is designed with a soft, thick warp and a thin weft. A normal cloth for barrel raising is the other way round. In knife raising the knife pushes the weft forward and scrapes the warp, thus raising it. The frictional properties which apply to barrel raising do not apply to knife raising. In the latter excessive lubrication is as bad as insufficient. The best results are obtained with a stabilised fatty acid emulsion.

A lot of finishing in the cotton trade is an attempt to make the cloth seem different from what it really is. Before the war the practice of heavy weighting was prevalent and a lot is still done today. Merchants used to demand that the finisher should, after bleaching and dyeing, put in enough finish to increase the weight by about 15%, and to return appreciably more than grey weight. At the same time it had to feel like pure cotton. Attempts to do this were commonly carried out with epsom and glauber salt together with a softener to counteract the harshness. To a lesser extent the much heavier barium chloride is used. Salt finishing and weighting is still carried out on cotton drill, ginghams, and flannelettes and the finish is applied by padding and cylinder drying.

A number of softening agents are available which are stable in solutions of 2 lbs./gall. epsom salts to the bath, e.g. Ceranine HCS, Sandozol KB. An ordinary sulphated castor oil is not very suitable, but a completely sulphated oil, such as Sandozol KB is perfectly stable. One difficulty in heavy salt finishing, particularly with glauber salt, is the tendency to "flowering." The cloth gets slightly moist, the moisture dissolves some of the salt, the cloth dries again and leaves the salt on the surface as a fine white powder. Softeners for barium chloride solutions are not easy to find, and in view of the poisonous nature of barium salts, there seems no justification for weighting with this compound, particularly on materials which are likely to be worn next to the skin. These salt weighted finishes are not fast to washing. Waxes can be incorporated in this type of finish as a means of obtaining a lustre if the cloth is calendered.

Proofing

To make a cloth completely waterproof it is necessary to coat it with some substance such as rubber, and this completely closes the spaces between the threads and makes it impossible for air to pass through to carry perspiration with it. For this reason many rain-coating materials are finished to be showerproof or water-repellent. The most common finishing agents are waxes, with or without aluminium salts, applied either mechanically or by chemical means. The water-repellent group can be divided into three sections:

(1) There is the old-fashioned method of finishing with aluminium acetate alone. The cloth is impregnated with a solution of 1–5°Tw. aluminium acetate. This was done either with a so-called red liquor or by the sugar of lead process. After dissolving lead acetate sufficient aluminium sulphate is added to precipitate the lead as sulphate. The aluminium acetate is then decanted. This method only gives moderate water-repellency and leaves the cloth rather harsh.

(2) A better proof than that produced with aluminium acetate alone can be obtained by impregnating the cloth with a solution containing 1½–2 ozs. soap per gallon, squeezing, and then passing through aluminium acetate, about 10°Tw. and drying. This method is messy and its only real merit is that under arctic conditions the proofing agent does not become brittle.

(3) The simplest method of obtaining a good water-repellent finish is to use one of the good proprietary auxiliary products which are available, either by the one or the two bath process. These products consist largely of paraffin wax emulsions containing aluminium salts, and a protective colloid.

The commonest method is to apply by padding but it can be done on a winch or in a jig. Drying should be carried out at as high a temperature as possible and it is important to dry bone-dry. Some of the emulsions are substantive and exhaust on to the fibre, and these are useful where long liquors must be used, as in the winch or even in the jig. They are applicable to animal, cellulosic, and synthetic fibres.

N.A. Finish

There is sometimes a demand for a non-absorbent finish to be subsequently rubber-proofed. This is met on cotton, on viscose and on acetate fabrics which are intended for the rainwear trade. It is important that the water-repellent agents used should be free from copper and manganese, otherwise the subsequent rubber-proofing may be impaired. In addition to the paraffin wax emulsions there are other types of water-repellent agents; the fatty pyridinium compounds such as Cerol WB are applied by padding and are then baked to give finishes which beside being water-repellent are of good resistance to washing and dry cleaning. The word resistance is used rather than fast because although the compounds are insoluble in dry-cleaning solvents some of the proof is removed by the mechanical action of the rotating dry-cleaning drums. The latest additions to the water-proofing range are the Silicones, which require a baking treatment, and the special chrome fatty compounds, such as Ombrophob C, which also has to be baked. One branch of the finishing trade is concerned with making acetate and viscose fabrics, particularly taffetas and satins, free from the fault of slipping. This trouble can occur quite easily due to the warp yarns slipping over the weft or conversely. This is not surprising when we remember that continuous filament rayons are quite smooth yarns.

Non-slip finishes are usually applied as a final wet process, normally in the mangle box, before the stenter. They depend for their efficiency on being powerful adhesives. The idea is to stick the threads together at the points where they cross. Typical products are Finish NSW and Finish NSE. It is a great advantage to have a very hot final compartment in the stenter when doing this work. If the cloth is stretched after it is dried, the seal between the cross threads is broken and unless the adhesive can be partly melted and allowed to flow to the slightly different positions of the cross threads the non-slip properties may be spoilt.

By the time the cloth reaches the last compartment of the stenter the stretching is complete and the softening of the resin in the last stage gives the desired result. Lining materials of either viscose or acetate are particularly prone to this defect and they are usually finished with a mixture of gelatine and a non-slip finishing agent.

One difficulty sometimes met in non-slip finishing is that the customers like a softer handle than the non-slip agent will give. It is fatal to try to make the finish softer by adding a softening agent. A non-slip finish is an adhesive, a softening agent is a lubricant and the properties are opposed to each other. Sometimes a non-slip finish will tolerate a very small amount of softener but only if the cloth is tightly woven. One of the best ways of mellowing such a finish is to press it in either a Yorkshire or rotary press.

Softening of cloth can be quite a problem due to the varying ideas which people have on this subject. Some like a finish to be soft and dry, another to be soft and moist, another to be soft and slippery, and another to be full without being firm.

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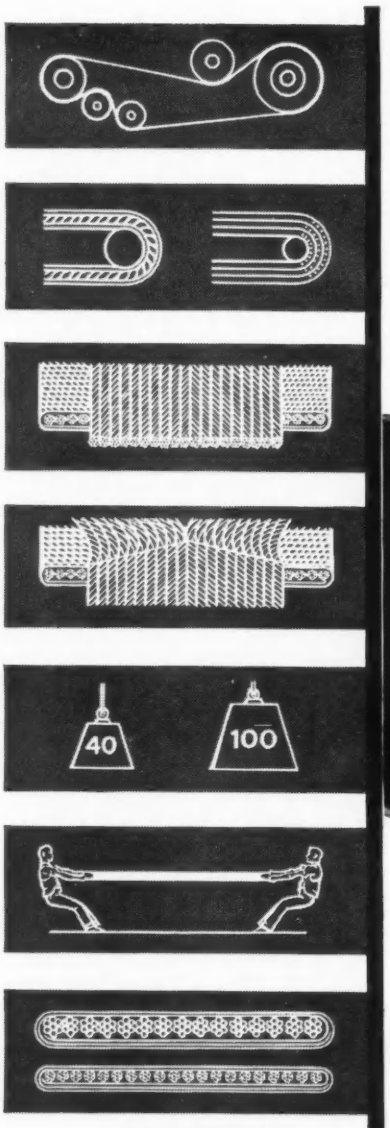

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Many really useful softening agents are now on the market. Some are cationic, but the majority are anionic and range from soap with its danger of rancidity and yellowing, to the stable and highly sulphated compounds. While on with the subject of softening agents I would like to repeat that it should be quite clear in our minds whether what we want is softening to give a pleasing touch, or fibre lubrication to give wearing properties.

When rayon was first made it was so hard and bright compared with pure silk that there was a demand that it be delustred to look like silk. The demand for delustring rayon has never disappeared although it fluctuates. One method is for the manufacturer of viscose or acetate to mix finely divided titanium oxide into the rayon solution before spinning. Another is for the cloth manufacturer to carry a stock only of bright material and ask the finisher to delustre those goods he requires in this type of finish. The earlier method of delustring viscose was to impregnate with barium chloride and then treat with glauber salt to precipitate barium sulphate in a fine form on the fibre. This barium sulphate had a strong tendency to dust off. Titanium dioxide probably forms the basis of most delustring agents on the market.

If the delustring agents are anionic or nonionic the most economical method of application is by padding as there is no substantivity. If the product is cationic it has affinity for the fibre and is suitable for long-bath application. Delustran A for example can be exhausted completely from a 30 : 1 liquor at 130°F. It should be remembered that all the white pigment delustring agents interfere with the depth of shade, particularly heavy shades, such as black, navy and nigger brown, in exactly the same way as white pigment lightens a paint.

Acetate rayon can be delustred in the same ways as viscose but in addition there is a well known chemical method which alters the surface of the filaments. The auxiliary products used for these surfaces are phenol and soap or a proprietary agent such as Syclapon ARN. By the soap/phenol method the procedure is to treat for ½–2 hours with 2–5 lbs. per 100 galls. soap and 2 lbs. phenol per 100 galls. at 200–207°F. A good matt effect can be obtained in 30 mins. but as there are some places in the cloth under slight tension the time is often extended to ensure that these places are not slightly brighter than the rest. Tension must be avoided wherever possible.

A wooden or stainless steel beck is probably the best type of vessel to use. Open winch work is unreliable and open jigs are unsuitable for full batches as only the ends are delustred. In this type of delustring there is always some loss in strength and the aim is to get the maximum dulling with the least tendering. As the temperature rises to 207°F. the rate of delustring increases, but from 207–212°F. delustring does not increase but tendering does. As a rule a delustring bath is used many times. It should be replenished after each batch of cloth but in spite of replenishment the impurities from the cloth interfere with the delustring of later batches.

Optical Bleaching Agents

When first introduced these were not very eagerly welcomed but are now widely used and are available for whitening all types of fibres. Their advantage over a fabric which has simply been well-bleached and blued is due to the fact that they send out to the eye, in the form of visible white light, energy which was absorbed as ultra violet light. In the ordinary way white light strikes the cloth and is reflected to the eye minus what has been absorbed. Even a well-bleached cloth absorbs some light and reflects the remainder with a slight yellowish tinge. By adding blue to the finish the reflected yellow is absorbed and although the tone looks more pleasing, in actual fact the addition of blue has decreased the amount of light which reaches the eye, and therefore it decreases the true brilliance.

An optical bleaching agent, however, absorbs ultra violet light which is invisible and re-emits it as a brilliant blue-violet. This is added to the reflected yellow and in this way more white light reaches the eye, than from a blue pattern. More white light simply means more brilliance. Some optical bleaching agents have a strong affinity for cotton and viscose, some for acetate, nylon, wool, etc. The affinity can be so great that even when applied by padding, quite a lot of dyeing actually takes place during the drying process. Some of these products possess very good fastness to washing.

A considerable yardage of cotton has been finished by padding through products of the Leucophor type, along with dextrine or starch. It is good practice when using dextrine to add a little ammonia or soda ash as the acid compound of an optical bleaching agent is somewhat subdued. Leucophor R, however, is stable under acid conditions. There has been some criticism that the fastness to light of these compounds is not very good, but recent additions to the range are improved in this respect. However, these are so far confined to the grades which are applicable to the man-made fibres. e.g. Leucophor PA which has a light fastness of 3–4 on nylon.

When these agents are applied to cellulosic fibres from long liquors they behave like dyestuffs, but the maximum affinity is usually nearer 140°F. than the boil. They exhaust better, especially on viscose, with an addition of salt. Some are applicable to wool from an acid bath, which at first does not seem logical, in view of the decrease of fluorescent power of the acid compound. What actually happens is that above 150°F. the wool salt of the acid compound is formed and this is fully fluorescent. These agents are resistant to some reducing agents and because of that prove useful in discharge pastes in printing.

SHRINKAGE IN LAUNDERING

(*continued from page 371*)

to run the risk of shrinkage through distortion. The machine action tended to disturb the fibres or filaments in the soft yarns and also to disturb the yarns so that they no longer lay straight in the cloth. Such shrinkage could not be offset by stretching treatment. The soft heavy rayon cloths called for gentle washing or dry cleaning.

Dutton had shown that in knitted fabrics shrinkage could arise through changes in the shape of the loops which made up the structure and his published papers gave some interesting examples of the effect of knitting structure on shrinkage. As far as the launderer was concerned this consolidation shrinkage, as it was called, was part of relaxation shrinkage, for both inevitably occurred on wet processing. Dutton had found that slackly knitted fabrics (i.e., relatively few courses per inch) showed a high length relaxation which might be accompanied by an increase in width. There could be few launderers who had not at some time come across interlock vests with almost square bodies brought about by a reduction in length and an increase in width. With the more tightly knitted fabrics the reverse happened; there was a pronounced width shrinkage but less length shrinkage than with the slack fabrics.

Somewhat analogous to consolidation shrinkage in knitted fabrics was the closing up of the weave in woven cellular cloths. This inevitably took place on washing and could account for considerable shrinkages. It was, however, largely reversible if the articles were pulled out to shape during drying or ironing, or even with some garments in the course of wear. The restoration of size by stretching was often much easier with cellular cloths than with knitted fabrics, but there was always a very real difficulty in knowing just how far to stretch any particular article in each direction.

From time to time one heard of garments or other articles having shrunk suddenly after several entirely satisfactory launderings. The most common cause of this trouble was a change in ironing procedure, e.g., from hand ironing at home to pressing at the laundry. Such shrinkage was reversible and all that was required was re-institute the use of the ironing procedure which gave the satisfactory finish. Whilst with woollens the same position may arise the complaint is quite often the one of sudden felting. It had been reported that it was possible for a shrink resistant finish to break down after a number of launderings so that the fabric became susceptible to felting whereas previously it was not. It was, however, difficult to prove such a breakdown when one only had the evidence of the felted article. A more likely explanation in most instances was that there had been a mistake in the laundering and that the garment had inadvertently received more vigorous processing than it should.

European Economic Co-operation

Articles indexed on the fifth reading list in the series issued by the Manchester Commercial Library cover a wide range of topics including the implications of a Free Trade Area for British taxation and restrictive practices in the Common Market. A number of recently published books and pamphlets are also listed. Copies of the reading list can be obtained from the Commercial Librarian, Central Library, Manchester 2 (Cen. 7401, Telex 66-149).

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Textile Trade and Prospects

Poor Trading in Yarns and Cloths

A reduction of the bank rate has not given any impetus to the pathetically slow trading conditions which have persisted during the past six months. Confidence in raw material prices leaves much to be desired and the steady closure of spinning and weaving mills adds considerably to the air of despondency affecting the entire industry. The annual holiday period is now beginning and with it many mills will have extended stoppages in addition to the short time working of past months. Business in yarns is very limited—even the home market offers no consolation—in these difficult times. Probably the fine side of the trade is the quietest section. Fine combed doubling wefts in singles and doubled counts are very poorly supported but yarns for the lace trade are in fairly good request although quality here is the very first consideration. Hosiery numbers are only moving slowly at the moment and, as wholesale stocks of these types of goods are still unusually high, there is little hope of any improvement for some time ahead. In general, inquiries have covered the whole range of production but firm orders are only of small proportions and in relatively small weights. The majority of orders have been for standard weaving counts on ring beams, cones and cheeses. Coarse counts are in modest request and sales on export account disappointingly low. Fancy and novelty folded yarns are well supported.

In cloths, even those types which have been in steady demand are now beginning to fall off and any repeat business is accompanied by strictly urgent delivery dates. Order books in most cases are in very poor shape. Few sheds have orders for several months ahead and contracts of any size are becoming rarities seldom heard of. Buying lacks both vigour and enthusiasm in all spheres of activity. Modest orders have been placed for certain lines of dress goods in dobby and jacquard designs in novel constructions, also for medium priced machine and screen printed qualities in both bold and quiet tones. Some very effective printed shirtings have been sold which, when made-up, look good and will give satisfaction in wear and appearance. One or two manufacturers report more interest in furnishing fabrics in which attention seems equally divided between traditional and contemporary designs in cotton, cotton/viscose, cotton/acetate yarns. A few colourful dobby designs have attracted some attention. Household textiles are in fair demand with a slightly better tone attaching to domestic quilts and a few specialities for hotels and shipping lines. Sheetings and good quality cotton blankets move reasonably well but towels in two-fold and condensor pile are not being absorbed as quickly as expected at this time of the year. Modest orders have been booked in certain industrial cloths but in nearly all cases buying is of a hand-to-mouth nature. Export business shows no improvement at all but imports of foreign cloth continue to pour in whilst the government ponders a problem for which they seem to have no solution and apparently very little interest in either the industry or the workers who are fast losing their livelihood. The textile industry is still one of the nation's vital assets and no political party with a glimmering of its importance can afford to allow this matter of unrestricted duty-free imports to proceed at an increasing rate.

South Africa's Wool Production

Serious drought in most of Cape Province has broken, but there has been little relief in Beaufort West, South Africa's second biggest wool-producing area. Farmers have had to kill lambs, trek with their flocks to other areas, or resort to hand-feeding. The average annual rainfall for Beaufort West is between 6 and 8 ins., but some parts have had little more than 1 in. since October. Even if heavy rain falls now the vegetation will not improve much because of the cold weather. Many farmers have been feeding flocks, at heavy cost, with lucerne and maize. Others have sent stock to districts where grazing is better. An encouraging feature is that sheep losses have been comparatively low because of improved scientific farming methods and consistent understocking of farms. This policy is now paying dividends. Wool sold by auction in the Union this season is expected to total about 292 million lb., or 10 million lb. below the 1956-57 figure, according to South African Wool Board estimates. The smaller clip is due mainly to prolonged drought in some main sheep areas. The income from wool in the current season, which ended officially June 30, is expected to be about £54 million, £18 million lower than in 1956-57. The average price will be about 44d. a lb., as compared with 57d. a year ago. Despite the lower wool prices this year, the figure of £54 million is higher than the income in the 1955-56 season, and is in fact the fifth highest since the end of the war.

The stock of 48,000 bales of wool bought in by the South African Wool Board under its price stabilisation scheme will be marketed in an orderly manner with advance notice to buyers and brokers. This was announced by Dr. J. H. Moolman (chairman of the Board) after a meeting in Port Elizabeth of the newly-formed Wool Marketing Advisory Committee, consisting of representatives of the Board, buyers and brokers. He said the stabilisation scheme, introduced early in March, had been very successful so far.

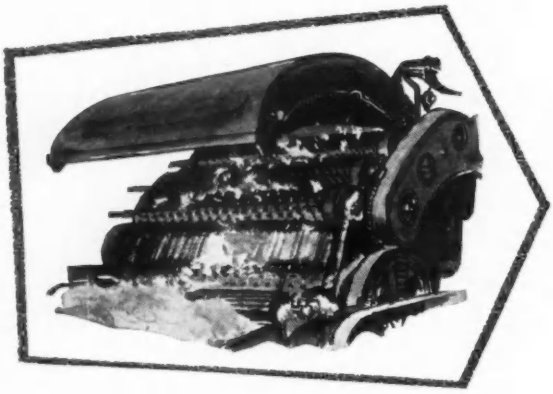
The next series of London wool sales, which should have opened June 30, was postponed because of the dock strike. If there is a general return of labour, states the Committee of London Wool Brokers, it is proposed to hold a sale of one week's duration starting July 14. The committee regrets that it is impossible to open the sales before this date owing to the amount of wool still to be handled from the last series of sales. They expect that there may be a larger carry-over of wool than usual from July to September, in which case the September series may be extended into a third week.

Linen Trade Review

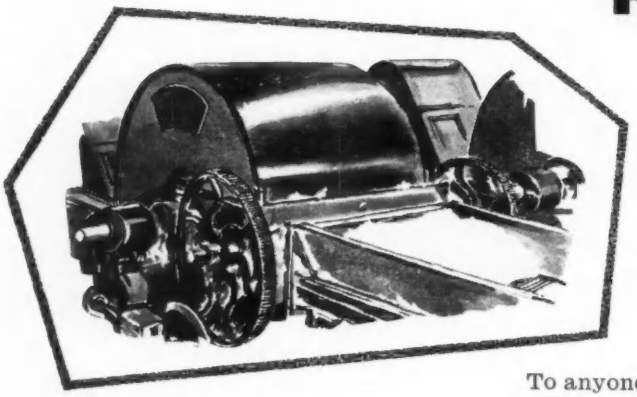
Quiet conditions prevail in all sections with the volume of incoming business scarcely sufficient to maintain production at present restricted levels. It is becoming increasingly apparent that the present productive capacity is much more than is required to meet the demand for the end products and, unless this can be stimulated by developing new or novel lines, or finding new outlets for current production, a substantial contraction in manufacturing capacity seems inevitable. In most concerns re-equipment and reorganisation have reached a stage at which little benefit can result from further expenditure in this direction. In fact, in some instances the higher productive capacity has proved embarrassing, as it has been impossible to dispose of production at a level which would ensure the economies on which outlay on re-equipment and reorganisation schemes was based.

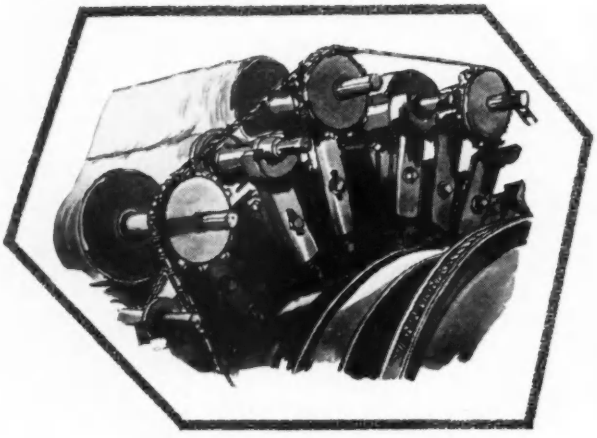
That consumer interest can be stimulated is seen from the profitable turnover effected by some concerns in the making-up end. These have scored successes on novelty and price, factors which point the road to a profitable turnover. There is much need to cultivate a new outlook by many in executive positions, particularly in the larger concerns. The writer was recently told by a director of a successful making-up concern of his unsuccessful efforts to make direct contact with the principals of a number of leading linen manufacturing firms regarding supplies of cloth, failing generally to get past the first line of subordinates. His eventual success with one firm has proved profitable to the latter, resulting in repeat business valued at approximately £1,000 per week which has been sustained over many months.

Small orders, which cover practically the whole range of household and personal use linens, with emphasis on early delivery, are the main features of home market demand. The wide range of competitive textiles now offered and the ever changing trends in consumer interest, have made it inadvisable for retailers to carry substantial stocks. Merchants are consequently compelled to carry larger reserves of a greater number of items to meet the requirements of their clients, so that the financial burden of these, and the risk of depreciation associated with fluctuating demand, is now



DO YOU RECOGNISE THESE?





To anyone in textiles a rag grinder, a tenterhook willey and a carding engine are so familiar that they are hardly worth a second glance. But they are worth a second thought—for friction and foreign matter in these machines have been the starting point of many a disastrous fire.

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being carried by the few instead of the many and has imposed a severe strain on the resources of the former in recent months.

While statistics published in the 1958 issue of "Industrial Fibres" (Commonwealth Economic Committee) show that at current market values the increase over pre-war value of flax is less by comparison than that of any other of the natural fibres, and substantially less than that of its main competitor cotton, this advantage is offset by greater economies effected in the conversion cost of the latter, and explains why the difference between flax costs and the selling price of manufactured goods is insufficient to cover processing costs. Weak selling by some manufacturers in recent months to release essential working capital has tended to depress retail prices still further, and has had an unsettling effect on the market.

Reports generally regarding the growing crop are favourable. The recent rains have stimulated growth, and drier weather conditions are now considered necessary to favour development of the fibre systems with maturity of the straw. In West European flax growing areas labour is concentrated on field work so that little fibre is coming forward from the scutch mills. Scutchers complain that current market values are insufficient to cover straw prices and manufacturing costs.

Man-Made Fibres and Fabrics

The past month has not been very encouraging and the Rayon Weaving Association's annual report for 1957-58 warns that what has happened with cotton could quite easily arise with rayon piece goods as far as overseas imports are concerned. It is, indeed, a gloomy picture and when one reflects on the number of firms that have gone out of business the position is far from happy. On the other hand, development of a more closely integrated section of the industry able to specialise in novelty lines and new cloth constructions is one which should offer some prospects of maintaining home trade and competing in certain overseas' markets.

Cotton spinning and weaving is certainly witnessing a transformation these days with more and more blends being spun, chief among these being mixtures of cotton/rayon, viscose/acetate, cotton/nylon and cotton/"Terylene"; the last-named is in steadily increasing demand. Weavers report fair inquiry for novelty weaves but the advent of drip-dry, for instance, has hit some of the well known 2-fold yarn fabrics used in dresswear. One big factor responsible for the slow-moving of apparel fabrics—apart from economic reasons—has been the prevailing weather up to now, although many traders are optimistic that stocks will now begin to move at a greater rate in the next few weeks. The wholesale trade is reported to be asking to an increasing extent for certain lines in printed and woven design dress fabrics and spun rayon shirtings of the crease-shedding types.

In the West Riding, business has been rather quiet lately. Stocks of wool are good and there is a wide range of man-made fibres to select from. The fashion trend in worsted and woollen goods has probably led to somewhat less demand on the whole for blended fabrics but later reports indicate that demand for most types of goods from suitings to furnishings is slowly improving; the business lost may not be recovered, however, even with a fine autumn.

Yarn spinners report a steady demand for all-nylon types from the Midlands, and various qualities for the hosiery industry indicate that the recession has not hit this section of the industry as great as, for example, Lancashire, although Yorkshire is now beginning to feel things a little quieter. Competition from Italian sources is tending to increase and is the cause of some concern in certain quarters. British manufacturers are not finding it easy to compete against cheap imported goods from the Continent to say nothing of those from Hong Kong.

The hosiery trade complains that some margins are fine, although the seamless hose trade is finding a somewhat stimulated demand and there has been a gradual increase in demand for tinted or coloured nylons. Half-hose manufacturers, too, report that the intervals have lengthened before repeats come through. The acrylic fibres are in fair request and high bulked yarns still in good demand. The question being asked is whether the acrylics, after such a successful entry, are not due also for a period of rather intense competition in most knitwear sections.

Leek trade is quiet at present, although it is hoped conditions will improve. Business on the whole is confined to small lots, chiefly of a replacement nature, and the adverse weather has led to a general curtailment of orders in wholesale and retail circles. Smallwares' manufacturers report fair business in cords, laces, etc., and there has been a somewhat surprising increase in demand for various classes of ribbons and woven labels. In the Macclesfield area, throwsters report only moderate business and this, too, is increasingly competitive.

Short Time Working in Jute Industry

Although demand for raw jute from consuming countries has been slow in recent weeks prices of fibres have remained remarkably steady. Evidence points to the Pakistan authorities being anxious to maintain prices for old crop as this will have a strong bearing on sales of new crop fibre. There has been a lack of rain in some jute growing areas in East Pakistan but the crop is well established, and if the monsoons are not too severe the crop should produce an out-turn of good class material. Some shippers are offering new crop jute on the same basis as old for July/Aug. shipment, but this is not attracting any attention. Small parcels have also been offered at a discount of £3 to £4 per ton for Aug./Sept. shipment but sellers are generally unwilling to state prices under the E.P.C. level and also make offers for shipment more than three months ahead. The Pakistan authorities will not register sales made at less than the fixed E.P.C. prices and it is also forbidden to make sales for shipment more than three months forward. Arising from the lack of demand for yarns and cloth stocks of raw material held by Dundee spinners is now greater in relation to their output than for some time. As a result, little raw material has been purchased. Some sales of spot material between spinners have been negotiated but the number of shipment parcels purchased have been few. Prices of some grades of white jute have become slightly easier but dark jute values remain steady. Quoted prices are now £115 for Mill Firsts, £100 Mill Lightnings, £89 Mill Hearts and £71 10s. grade Hearts, c.i.f. U.K., June/July shipment. Grade Tossa-2/3 is £115 and grade Tossa-4 £106 with Continental Tossa-2/3 £100. Crack Daisee-2/3 is £105 and grade Daisee-2/3 £98, c.i.f. U.K., June/July.

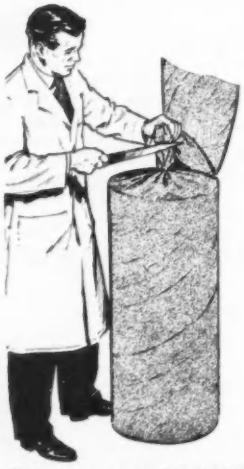
The jute industry complains that the high material prices will have to be reduced to make yarns and goods more attractive. Pakistan, however, seems able to maintain exports of raw jute at a fairly high level and apparently convinced that exports during the coming season will remain constant. Although jute consumption in Western countries has fallen during the past year there has been an increase in exports to the Far East. The outlook at present, is that Pakistan will do her utmost to maintain prices of jute at or near the present level. She is in need of foreign currency and cannot afford to export her main cash crop at less. This may be a short-sighted policy but the urgency of acquiring foreign exchange to purchase capital equipment is very great. The Calcutta goods market has shown little change and prices have remained fairly steady since the minimum price agreement by Indian mills came into force. Offtake of goods has been steady but the withdrawal of import licences by Argentine last month had a temporary affect on which is now being overcome. Demand from the U.K. has been small and mainly for hessians. Quotations are at 61s. 3d. for 10 oz. 40 in., and at 45s. 10d. for 7¼ oz. with 11 oz. 45 in. at 67s. 6d. per 100 yds. f.o.b. Calcutta for June shipment. B twills were quoted at 149s. June.

Demand for yarns in Dundee has been small; the one bright feature has been the steady offtake by the carpet industry. Mills have reduced output and there is now a good deal of idle machinery. Practically all descriptions of yarns can be obtained for immediate delivery and consumers are purchasing only immediate needs. Price adjustments made in May did not bring the additional business anticipated. There is a lack of demand and the fact that consumers know fair stocks are held by spinners restricts business to small quantities for quick delivery.

Business in cloth has been small and has resulted in a considerable amount of short time working. On average it is possible that the output by Dundee mills is now equal to a three-day week without much sign of any improvement. The manufacturers worst affected are in the heavy end of the trade but demand for sackings and tarpaulins has been limited for some time; orders generally placed at this time of year have not come along and some consumers are using other materials for sacks and bags. From now until orders are placed for autumn requirements it is expected that demand will remain at a low level. Although prices of flax are low compared to most other natural fibres and prices of some yarns were further reduced this month, demand is still low and a good deal of short time is now evident. Price does not appear to matter to any great extent but there is a complete lack of demand.

Change of Address

The Birmingham branch of English Electric Co. Limited, has been moved from 75 New Street, to larger premises at Pitmaston, Moseley, Birmingham 13. (Tele. SOUth 4021/5).



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Notes and News

Prices of Nylon Yarns

C.F. Yarn Prices—

Den/Fils/Twist	Type	Container	Price/lb.
6/1/$\frac{1}{2}$ Z	Semi-dull	Flangeless tube	75/6
9/1/$\frac{1}{2}$ Z	,,	,,	59/7
12/1/$\frac{1}{2}$ Z	,,	,,	46/8
15/1/$\frac{1}{2}$ Z	,,	,,	35/11
20/1/$\frac{1}{2}$ Z	,,	,,	28/5
20/7/$\frac{1}{2}$ Z	,,	,,	26/2
30/10/$\frac{1}{2}$ Z	,,	,,	15/10
30/10/$\frac{1}{2}$ Z	Fully dull	,,	16/7
40/13/$\frac{1}{2}$ Z	Semi-dull	,,	13/4
40/13/$\frac{1}{2}$ Z	Fully dull	,,	14/1
45/15/$\frac{1}{2}$ Z	Semi-dull	Magnesium alloy bobbin & flangeless tube	12/8
60/20/$\frac{1}{2}$ Z	,,	Flangeless tube	11/6
60/20/$\frac{1}{2}$ Z	Bright	,,	11/6
60/20/$\frac{1}{2}$ Z	Fully dull	,,	12/3
70/34/$\frac{1}{2}$ Z	Semi-dull	,,	11/5
100/34/$\frac{1}{2}$ Z	,,	,,	11/3
100/34/$\frac{1}{2}$ Z	Bright	Magnesium alloy bobbin	11/3
150/50/$\frac{1}{2}$ Z	Semi-dull	Magnesium alloy bobbin & flangeless tube	11/2
205/34/1 Z	,,	Magnesium alloy bobbin	10/9
205/34/1 Z	Bright	Magnesium alloy bobbin	10/9
210/34/$\frac{1}{2}$ Z	High tenacity Bright	Flangeless tube	10/6
210/34/1 Z	High tenacity Bright	Magnesium alloy bobbin	10/6
840/136/1 Z	Extra high tenacity	T.C. bobbin	10/–

Staple Fibre—

Den./Len.	Type	Price/lb.
1$\frac{1}{2}$ den. 1$\frac{1}{2}$"	High crimp	10/3
3 ,, 1$\frac{1}{2}$"	,,	9/9
3 ,, 1$\frac{1}{2}$"	,,	9/9
3 ,, 2$\frac{1}{2}$"	,,	9/9
3 ,, 2 - 3"	Extra high crimp	9/9
3 ,, 4"	High crimp	9/9
3 ,, 3 - 5"	,,	9/9
6 ,, 2$\frac{1}{2}$"	Medium crimp	9/9
6 ,, 4"	,,	9/9
6 ,, 6"	Low crimp	9/9
6 ,, 4 - 6"	Medium crimp (bright & semi-dull)	9/9
10 ,, 2$\frac{1}{2}$"	Medium crimp	9/9
10 ,, 4"	,,	9/9
18 ,, 2$\frac{1}{2}$"	,,	9/9
18 ,, 4"	,,	9/9
18 ,, 6"	,,	9/9

Combed Top—

3 den. 2 - 3"	Extra high crimp	11/4
3 ,, 4"	High crimp	11/4
3 ,, 3 - 5"	,,	11/4
6 ,, 4 - 6"	Medium crimp (bright & semi-dull)	11/4
18 ,, 6"	Medium crimp	11/4

Glycerine in Anti-Static Compositions

Anti-static compositions for natural and synthetic fibres, are prepared by mixing (*a*) the condensation products of ethylene oxide and lauryl alcohol, (*b*) polyglycols with a variable molecular weight, and (*c*) the condensation products of ethylene oxide with glycerol, and agitating to obtain a homogeneous mixture. The composition has a low viscosity and an excellent wetting power, and is apt to be emulsified in water. Example: a mixture of 25 parts of a condensate of ethylene oxide with lauryl alcohol, 35 parts of a polyglycol with a molecular weight of 200, and 40 parts of a condensate of ethylene oxide with glycerol having a molecular weight between 230 and 110, is agitated. (Belgian Pat. 556,197.)

Association for Quality Control (Textiles)

During the winter of 1957/58 a study group for quality control in cotton spinning met under the auspices of the Productivity Centre of the Cotton Board. One development of this was the very successful one-day conference on quality control held recently in Manchester. The large attendance at the conference underlined the general opinion that there existed a need for an organisation dealing specifically with this aspect of textile production. It was, therefore, decided to form an organisation with the title "The British Association for Quality Control (Textiles)." A temporary committee has been formed consisting of Mr. W. Atherton (Newroyd Mill Ltd., Oldham); Mr. F. Charnley (13 Woodlands Road, Handforth); Mr. A. Cross (Secretary) (Charles Crabtree Ltd., Ferney Mill, Todmorden); Mr. R. Fullard, John Bright and Bros. Ltd. (Fieldhouse Mill, Rochdale); Mr. E. Morris (Crosses and Heaton Ltd., Bolton). Those interested in membership should communicate with either the secretary or a committee member.

Les Files de Calais S.A.

It is announced that Les Filés de Calais S.A. are considering a project for the manufacture of the acrylic fibre ('Courtelle') developed by the parent company Courtaulds Ltd. The fibre would be produced at the company's viscose factory at Calais where there is ample room for building expansion, and where provision for the necessary services already exists.

Procion Black HG

This new Procion dyestuff (I.C.I. Dyestuffs Division) is admirably suited for outline and fall-on work in all-Procion styles by either roller or screen printing; in pale shades it gives a neutral grey of good light fastness. The normal Procion printing recipe is used, with an addition of Resist Salt L to ensure correct shade development, and steaming, for a minimum of 10 mins., is necessary to achieve proper fixation. Printing pastes of Procion Black HG have the same high stability as those of the other Procion "H" brands.

In dyeing, the principal use of Procion Black HG is expected to be as a grey, although on mercerized cotton and viscose rayon it builds up well to full black shades. Dyeings have good fastness to light and washing and withstand crease-resist finishing treatments of U/F and M/F type. All established application procedures for Procion "H" type dyestuffs, including hot batchwise application, can be used with Procion Black HG. On viscose rayon, however, a much greener shade is produced by the pad (carbonate)-dry-steam process than by the pad (carbonate, urea)- dry-bake process.

Uses of New Latex

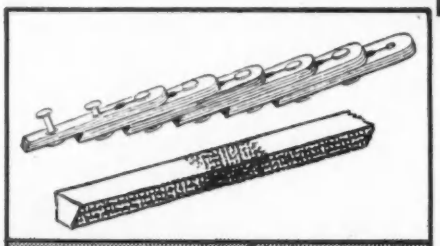
A new synthetic rubber latex for applications in the textile industry has been developed at the Dunlop Research Centre in Birmingham. Known as Politone K.745, it will, it is said, considerably improve the abrasion resistance of rayon, gaberdine and cotton, and can also be used as the binding agent on non-woven fabrics where oil-resistant properties are required.

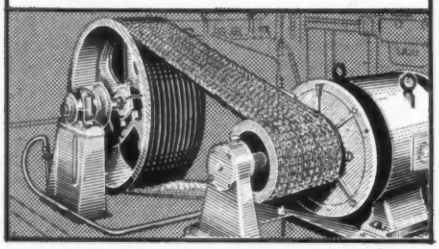
Nylon Anoraks

Cold weather clothing worn by members of the successful Trans-Antarctic Expedition included nylon anoraks. The garments were made up from nylon "Furleen" with an outer covering of cotton-and-nylon fabric. Although light in weight, unbulky and easy to wear these nylon anoraks provided excellent protection against the intense cold and biting winds. They are tremendously tough and strong, and the nylon fur fabric has excellent frost-shedding properties.

In this photograph, a nylon-clothed member of the expedition watches two colleagues fishing through a hole in the ice (nylon anorak by Astraka Ltd.)

the end to endless trouble





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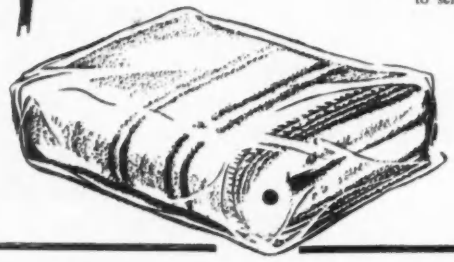

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New Cotton Board Films

The Cotton Board has added to its film library two new 16 mm. sound and colour films, "Village Wedding" and "Needle and Cotton." Produced by Verity Films Ltd., with the advice of the Colour Design and Style Centre and the assistance of many cotton firms, the films have been designed to enable the Cotton Board to offer to women's groups a varied and entertaining film evening in which different aspects of cotton's attractiveness and usefulness are displayed. Other films include "Any Questions on Cotton," a forum on the usefulness, qualities and treatment of cotton over which Freddie Grisewood presides; "Jacqueline Mackenzie Buys Britain's Cotton," in which the television performer makes herself typically at home amongst three groups of cotton merchandise; and "Spun, Woven and Finished," in which the development of a cotton fabric from the cotton field to the finished cloth is outlined. The films are distributed by the Cotton Board Industry Relations Department which now has eight films available on loan free of charge. All enquiries should be addressed to the Cotton Board, Industry Relations Department, 3 Alberton Street, Manchester 3.

New Appointment

Bradford Dyers' Association Ltd., 161-167 Oxford Street, London, W.1, announce the appointment of Mr. R. B. Wells as London manager following the retirement of Mr. T. J. Andrew.

European Management Conference

The 1958 European Management Conference is being staged by the International Committee for Scientific Management (C.I.O.S.) in Berlin, October 1 to 3. Senior executives, representatives of research and educational organisations from the twenty-nine member countries will meet to hear international authorities speak on the topical and controversial subject of European economic integration in its widest sense and its possible impact on management. Further information on the conference will gladly be supplied by the British Institute of Management, Management House, 80 Fetter Lane, London, E.C.4.

Latex Compounds

The new factory of Rubber Latex Ltd., on the Sharston Industrial Estate, Wythenshawe, Manchester, which was opened recently covers an area of over 30,000 sq. ft. This is an increase of over 50% on the old premises at Trafford Park and there is room for further expansion when required. The main feature of the new factory lies in the emphasis placed upon the bulk handling of latex compounds and this, combined with the latest equipment installed in the service laboratories will greatly enhance the service the company offers customers. An extension to the laboratory block houses a latex applicator and drier to rubberise lengths of carpet, felt and other materials up to 27 ins. wide by spraying, immersion or lick roller application. Rubber Latex Ltd., manufacture a wide range of natural and synthetic latex compounds for backing conventional carpets, felts, upholstery fabrics, etc., and for dipping, casting, non-woven fabrics, rubberised curled hair, and for many other purposes.

Cotton Mission to Egypt

A mission from the International Federation of Cotton and Allied Textile Industries will visit Egypt early in April in order to discuss current problems regarding raw cotton exports with Egyptian government officials and industry representatives. The mission will be composed of two cotton spinners, Herr H. Otto, Germany and Signor T. Piccardo, Italy, and Mr. M. Ludwig, director, International Cotton Federation, who will act as rapporteur. The mission will pay particular attention to the new administrative set-up at the Egyptian testing house and the new spinning test mill at Alexandria, two testing establishments under international management for testing moisture content and spinning properties of exported Egyptian raw cotton. The members of the mission will also be received in audience by the Minister of Agriculture and the Minister of Commerce and Industry in Cairo.

Fashion Colours for Spring and Summer 1959

The British Colour Council's fashion colours for spring and summer 1959 consisting of ten colours for knitwear, thirty-one for wool, thirty-six for silk and man-made fibres and twenty-two for cotton were sent to members of the Council's Women's Wear Division and the sections concerned in May. Accessory colours for millinery and leather, co-ordinated with the above ranges, will be issued in August, and colours for hosiery to tone with the new season's fashion colours, in October.

Heat, etc. Resisting Alloys

E. H. Bennet and Son, 124 Seymour Place, London, W.1, have been appointed southern area representatives of Sheepbridge Alloy Castings Ltd., specialists in heat resisting and corrosion resisting alloys.

New Companies

Commercial Combing Co. Ltd. Private. Reg. April 8. Capital £6,000 in £1 shares (5,000 1% cumulative preference). Combers and recombers of wool and other textile fibres, etc. The directors are: Bryan Becker, Gable Cottage, Claygate, Surrey, and Geoffrey M. Wolf, 15 Cecil Close, Mount Avenue, W.5.

Supertextiles Ltd. Private. Reg. April 2. Capital £500 in £1 shares. Manufacturers and dealers in textiles, etc. Registered Office: 51 Beak Street, W.1.

Samuel Farmer and Company Ltd. Private. Reg. March 31. Capital £200,000 in £1 shares (180,000 ordinary and 20,000 7% cumulative preference). Merchants, wholesale and retail dealers in textile fabrics and goods of all kinds. Solicitors: Allen and Overy, 3 Finch Lane, E.C.3.

Morton and Stanway (Macclesfield) Ltd. Private. Reg. April 11. Capital £3,000 in £1 shares. Manufacturers and dealers in textiles, etc. Registered office: Martins Bank Chambers, Park Green, Macclesfield.

Harold Bagley Ltd. Private. Reg. April 11. Capital £20,000 in £1 shares. Mungo, shoddy and merino manufacturers, etc. Registered office: Church Mills Church Street, Ossett.

B.D.S. (Industrial Fabrics) Ltd. Private. Reg. April 10. Capital £1,000 in £1 shares. Manufacturers and dealers in industrial fabrics, cotton, cloth, etc. Registered office: 35 Henton Road, Leicester.

Moore and Carter Ltd. Private. Reg. April 10. Capital £5,000 in £1 shares. Hosiery manufacturers etc. Registered office: 17A Crafton Street, Leicester.

Mocambique Comercial Limitada. Particulars filed April 15, 1958, pursuant to Section 407 of the Companies Act, 1948. Capital 2.000 contos in 2 shares of 1,000 contos each. Reg. in Portugalon Dec. 4, 1946. Importers and distributors of raw cotton, exporters, commission and consignment agents. British address: 3 Thames House, Queen St. Place, E.C.4.

A. Beckman (Textiles) Ltd. Private. Reg. April 18. Capital £10,000 in £1 shares. Wholesale and retail dealers in textile fabrics: manufacturers and importers etc. Solicitors: Lionel Leighton and Co., 1 Duke Street, W.1.

Gen Marchington Fashions Ltd. Private. Reg. April 18. Capital £5,000 in £1 shares. Cloth merchants, brokers, convertors, manufacturers and dealers in cottons, cretonnes, casement cloths, etc. Registered office: 50 Chestergate, Macclesfield.

Harrison Gardner (Melangers) Ltd. Private. Reg. April 22. Capital £10,000 in £1 shares. Dyers, bleachers, printers, finishers, combers and melangers of yarn, slubbing, wool, etc. Registered office: Victoria Works, Hightown, Liversedge, Yorks.

Yealmpton Hand Weavers (Plymouth) Ltd. Private. Reg. April 28. Capital £3,000 in 2,000 ordinary shares of £1 and 4,000 founders' shares of 5s. each. Registered Office: The Weavers Place, Yealmpton, Plymouth.

A. McGregor and Co. (London) Ltd. Private. Reg. April 29. Capital £15,000 in £1 shares. Silk mercers, etc. Solicitors: Birkbeck, Julius, Coburn & Co., E.C.2.

Carpets and Fabrics Ltd. Private. Reg. April 29. Capital £5,000 in £1 shares. Manufacturers and dealers in carpets, cloth, canvas, etc. Registered Office: 66 Newman Street, W.1.

C. Hargreaves Ltd. Private. Reg. April 30. Capital £10,000 in £1 shares. Merchants, merchant converters, makers-up and sellers of textile fabrics, clothing etc. Registered Office: 20 Major Street, Manchester.

Hill Nettl and Co. Ltd. Private. Reg. May 1. Capital £50,000 in £1 shares (25,000 "A" and 25,000 "B"). Wool merchants and topmakers, woollen, worsted and cotton spinners etc. Registered Office: Woolston Warehouses, Grattan Road, Bradford.

F. A. K. Reece Ltd. Private. Reg. May 8. Capital £500 in £1 shares. Spinners, weavers, hemstitchers, plaiters, pleaters, etc. Registered Office: 29½ Overton Road, Leicester.

C. U. Black Ltd. Private. Reg. May 12. Capital £500 in £1 shares. Textile merchants, and converters, etc. Registered Office: 6 Dorchester Street, Manchester 14.

G. R. Textiles and Co. Ltd. Private. Reg. May 13. Capital £1,000 in £1 shares. Importers, exporters, merchants and manufacturers of rayon, silk, etc. Registered Office: 2 Mount Street, Manchester.

Art Fabrics (Halton) Ltd. Private. Reg. May 14. Capital £1,000 in £1 shares. Combers, spinners, dyers and dealers in wool, cotton, silk and other fibrous and plastic substances, etc. Solicitors: Simpson, Curtis and Co., Leeds 1.

Tralee Fashion Knitwear Ltd. Private. Reg. in Dublin April 14. Capital £25,000 in 16,500 "A" and 8,500 "C" shares of £1 each. The directors are: Gerhard Bahner, Lauingen-Donau, Dillinger Strasse 25, Germany; and John O'Connor, 4 Lapps Quay, Cork.

H.T.M. Ltd. Private. Reg. May 16. Capital £5,000 in £1 shares. Silk merchants and mercers; cotton spinners, dyers, etc. Registered Office: Leith House, Gresham Street, E.C.2.

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150 MVA at 3·3 kV
250 MVA at 6·6 & 11 kV
350 MVA at 11 kV

Type V1H, air-insulated. Type V2H, compound filled. Available for ratings of 400, 800 and 1,200 amps.

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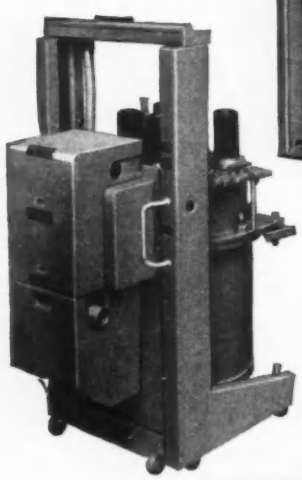

These three illustrations show the clean design. Cubicle doors open to allow breakers to be pulled forward on their trucks but, in addition, they can be readily removed from their hinges to give full access to the interior without obstructing the space in front of the switchboard.

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RECENT TEXTILE PATENTS

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777,356 Non-Woven Linings, etc.

CARL FREUDENBERG KOMMANDITGESELLSCHAFT AUF AKTIEN, *Weinheim an der Bergstrasse, Germany.*

Manufacture of non-woven, porous fleece materials, which are suitable for use as shape-retaining and stiffening inserts for articles of clothing which are also age-resistant after repeated chemical cleaning. Random-fibre fleeces are impregnated with dispersions or emulsions of natural or synthetic rubber, having vulcanizing agents which contain fixed sulphur and may also contain additional substances such as vulcanization accelerators, wetting agents, thickening agents or fillers. The material is vulcanized in such a manner that the process is carried out in the absence of free sulphur, the vulcanizing agents not containing free sulphur, and in the use of accelerators those not containing free sulphur are used. In an example, a mixture having the following composition is used to impregnate the fibre fleece:—

62·5% natural rubber.
27·5% softened water.
1·3% vulcanization accelerator (zinc salt of ethyl-phenyl-dithiacarbamic acid.
0·2% zinc oxide, active.
2·5% tetraethyl-thiuram-disulphide.

The vulcanization of the fibrous structure impregnated with an emulsion or dispersion of this mixture is carried out at 110°C. The vulcanization period lasts about 4 hours.

777,449. Elastic Fabrics and Yarns

BLEACHERS' ASSOCIATION LTD, *Blackfriars House, Parsonage, Manchester, and* BRADFORD DYERS' ASSOCIATION LTD., 39 *Well Street, Bradford.*

A process for the manufacture of elastic fabric or yarn which comprises mechanically shrinking synthetic thermoplastic fabric or yarn in a compressive shrinking machine to a pre-determined length shorter than its normal length. The thermoplastic fibres of the material are then set in their altered form by heating and cooling.

777,534 Dyeing of Acrylonitrile Copolymer Fibres

KUNSTZIJDESPINNERIJ NYMA N.V., 36-38 *Waalbandijk, Nimeguen, The Netherlands.*

A process for dyeing fibres of difficulty-soluble copolymers of acrylonitrile having little or no affinity for normal acid dyestuffs from a dye bath comprising an acid dyestuff which contains a complex bound metal. The dye-bath contains additionally a water-soluble alkali metal salt, and dyeing is carried out at a temperature above 100°C. In one example 400 grams of yarn of a copolymer of acrylonitrile (95%) and methyl methacrylate were dyed for one hour at 125°C. in a bath having the following composition: 7,250 c.c. of water; 10 grams of Irgalan Red 3G. In this way a very pale colour was obtained. The experiment was repeated, but 75 grams of sodium sulphate were added to the bath and a dark red yarn was obtained.

778,380 Silk Screen Printing Apparatus

D. M. JOHNSON, "*Kilvora,*" *Kilmore Road, Lurgan, Armagh, Northern Ireland.*

Apparatus for the process of silk-screen printing of fabrics, consists of a silk-screen frame A which is connected to a wheeled mounting B. The mounting consists of an angle iron 1 extending the length of one end of the frame. At each of its ends the angle iron has a flange carrying a wheel 2, the wheels engaging accurately in a rail 3. The angle iron incorporates a bar 4 which presents screw-threaded bolts 5 which pass through open ended slots in plates 6 which are secured to the upper face of the end of the frame. The bar 4 is carried by brackets 8, one at each end, and the vertical arms are adjustable in posts 9, so that the bar is adjustable. Adjustment is effected by bolts 10 on brackets 8 passing through a slot 11 in each post 9. Each post is supported by one end of a rod 12 which passes through a block 13 secured to the angle iron. The rods are adjustable in the blocks to permit horizontal movement of the frame A so that the frame may be correctly positioned on the table. The rods project to provide handles 12A which are used in adjusting the frame and may be used in carrying the frame to and from the table, when necessary.

778,660 Jute Loom Picker

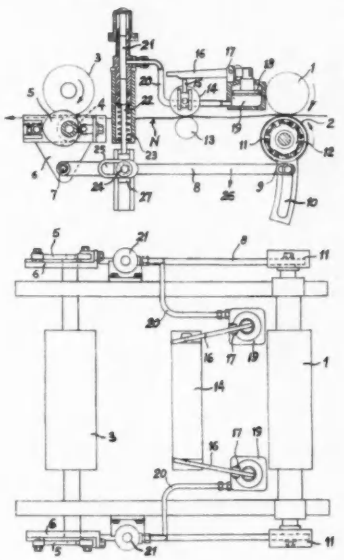
A. HAAG, 1 *Möttlingerstrasse, Weil der Stadt/Württ, Germany.*

A curved picker for an automatic jute loom, comprise a light-metal carrier part which is of I-shaped cross section in the area between the spindle guide and the shuttle striking member, and which has a taper towards the shuttle striking member. A buffer of an elastomer material with rubber-like elasticity is around the carrier so as to encircle a part of it, the buffer being shaped so as to jut out from the encircled part where it engages the shuttle.

778,831 Automatic Count Correction on Spinning Machines

F. CALZONE, *Bostone, Brescia, Italy.*

A device for adjusting the count on a spinning machine. Rollers 1 and 2 feed a sliver N to a pair of drawing rollers 3 and 4 and two heart-shaped cams 5 are fitted to the ends of the rollers 4. The cams each act upon a slide 6 which carry a pivot 7 for a connecting rod 8 having secured to its end pivot 9 engaged by a slot 10 in an arm fixed to a collar 11 of a free wheel device of roller wedge type 12 keyed to the end of the feed roller 2. The constant speed rotation of the drawing rollers 3, 4, and hence of the cams, moves the connecting rods 8 with a reciprocating motion, thereby oscillating the outer collars 11 of the free wheel devices and rotating the roller 2 by pulses. A pair of count rollers 13, 14 are arranged between the feed and drawing rollers for measuring the count of the sliver and receive a constant speed movement. The shaft of the roller 13 is stationary, while roller 14 is displaceable to follow variations in thickness of the sliver, its end pivots each carrying an extension 15 acting on a beam 16 oscillating about a pivot 17. The beams 16 each act on a movable unit 18 enclosed in a chamber 19 filled with liquid communicating through a conduit 20 with a hydraulic cylinder 21. The cylinders 21 are arranged over the two connecting rods 8, their plungers 22 acting against the action of springs 23 and each carrying a pivot 24 engaged by a slot 25 in its associated connecting rod 8. Variations in



thickness of the sliver move the roller 14 in a vertical direction and displace liquid between the chamber 19 and cylinder 21. By way of example, as the thickness of the sliver increases, the units 18 are lowered, liquid being forced towards cylinders 21, thereby lowering the plungers 22. The connecting rods 8 then oscillate in the direction of the arrow 26 lowering their end pivots 9. The movement of the connecting rods under the action of the cams 5 causes, through the increase in the arm length acting on the collar 11, the free wheel devices 12 to move through a smaller distance. The mean speed of the feed rollers is reduced relatively to the speed of the drawing rollers, whereby the sliver is reduced in thickness down to the required value.

779,021 Automatic Embroidering Machines

VEB SPEZIALNAHMASCHINENWERK LIMBACH, 5 *Pestalozzistrasse, Limbach-Oberfrohna* 1, *Germany*.

A Jacquard device for embroidering machines for adjusting the embroidery frame pantograph by means of a wheel which obtains rotation from a rack, which is movable by the sinkers, while the rack is disengaged from the wheel between two adjusting movements and the wheel is secured against rotation during this time by means of a locking tooth. The sinkers are driven by means of a crank and connecting rod drive, and similarly the alternate engagement and disengagement of the locking tooth and the rack. For this purpose, the latter are so actuated by two lever systems that the locking tooth and the rack are engaged in the two dead centre positions of the crank.

779,125 Electro-Magnetic Operation of Loom

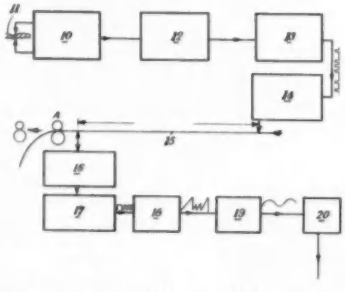
AUTOMATIC SWITCHING LTD., 1 *Franciscan Road, London, S.W.*17.

Where the individual operations of a loom are controlled by means of electrical conditions extended from a central control such as that described in B.P. No. 779124, there is a requirement for several operations to be effected with a carefully controlled and limited amount of force. The movements involved are: the winding-off of the warp beam, the operation of the heddles, the beating-up by the reed, and the winding-on of the cloth beam. One or more of these operations is effected by means of a clutch or clutches electro-magnetically controlled and constructed so as to slip when the required movement is complete whilst at the same time exerting a pressure sufficient to hold the final position. The clutch releases when a new electrical condition is received from the control equipment. Variation of the applied voltage determines the degree of slip between the two clutch surfaces.

779,197 Automatic Regularity Control for Slivers, etc.

T.M.M. (RESEARCH) LTD., *Hartford Works, Oldham*.

Apparatus for removing irregularities of thickness in a sliver includes a transducer 10 by which the thickness of the input sliver 11 is measured by means capable of emitting an electric signal the amplitude of which varies and is proportional to the thickness measurement. The signal is converted by apparatus 12 to an electrical pulse inversely proportional in frequency



to the amplitude of the signal. The pulses emitted from the converter 12 are passed to the shaping switch 13. A pulse from 12 starts a "squared" pulse: the subsequent pulse from 12 terminates or chops this pulse and starts the next pulse. Thus, the output from 13 consists of a series of squared pulses, the width of which is inversely proportional to the pulse frequency and therefore directly proportional to the initial signal amplitude, i.e. the sliver thickness. The pulses of varying width are recorded magnetically by a head 14 upon a tape 15 which is driven at constant speed by the back pair of drafting rollers A. A magnetic pick-up 16 transforms the varying magnetic pulse width as recorded on tape 15 into an electrical signal which, after amplification and shaping by the unit 17, corresponds to the original square pulse wave recorded on the tape 15. The square pulse is differentiated to trigger a saw-tooth generator 18, the resultant saw tooth wave having an output directly proportional in amplitude to the pulse width, and after smoothing by the unit 19, this output is employed as a signal by which the output speed of a variable-speed driving mechanism 20 is controlled. The mechanism 20 is used to drive the front rollers B either directly or indirectly through an auxiliary speed control including a differential gear.

779,208 Treating Wool Felts

B. F. GOODRICH CO., 230 *Park Avenue, New York, State of New York, U.S.A.*

A method for treating wool, comprises contacting wool with a beta-lactone in the presence of sufficient water to saturate the wool fibres, the beta-lactone being present in an amount sufficient to obtain at least about 10·0% lactone pick-up based on the weight of the untreated wool. As the amount of lactone picked up by wool increases, the felt properties of wool steadily improve.

779,250 Improved Spool Axminster Carpet Looms

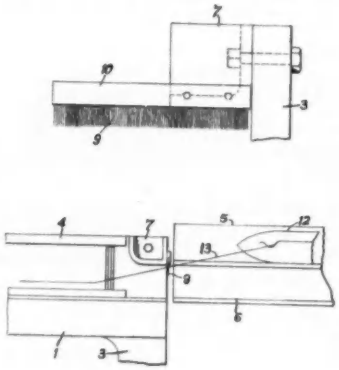
W. HILL (KIDDERMINSTER) LTD., *Worcester Road Works, Kidderminster, and* W. HILL.

An improved spool Axminster carpet loom has a gripper mechanism which is located below and which works from below the carpet being woven to draw the pile yarn threads from above the work and to work these threads into the weave to form the tufts with a downwards and upwards movement. Associated with the gripper mechanism is a comb device for ensuring the maintenance of the correct spacing of the warp ends during the insertion of the tufts.

779,285 Weft Control on Automatic Looms

W. V. GLEDHILL, *of Ty Bryn, Holmfirth, and* A. CHAPPELL.

Describes a device on automatic looms whereby the trailing weft end is held in the path of the jaws of the weft grabber. The



sley is shown at 1 and part of the sley sword at 3, whilst 4 is one end of the reed, and 5 and 6 are two shuttle boxes. A shuttle guide 7 fixed to the sley back prevents the shuttle from jumping upward when it is entering the box. Fixed to one end of the guide is a device in the form of a brush 9 of coarse wool yarn or fibres, projecting from a frame 10. When a shuttle 12 has passed beneath the brush into the shuttle box 5, and the boxes are raised so that box 5 is in its upper position, the length of weft 13 extending from the fell of the cloth to the shuttle eye (not shown) will engage with the stands of the brush. This engagement prevents the thread from swinging, and the thread is therefore held in a position where it will be caught by the jaws of the weft grabber when the loom beats up.

779,375 Roller Drafting Mechanism

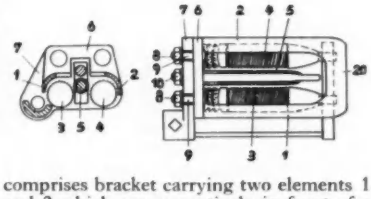
SKF KUGELLAGERFABRIKEN GESELLSCHAFT MIT BESCHRANKTER HAFTUNG, 13 *Ernst Sachs Strasse, Schweinfurt am Main, Germany*.

A drafting mechanism has a top roller carrier arm extending over at least one top roller and carrying top roller holders incorporating the top roller weighting means and capable of being retained in operative position by means of a catch mechanism incorporating a pressing means which extends through the top of the top roller carrier arm and is under the influence of a spring. The pressing means is arranged in the front part of this arm and has the form of a pressing button movable at right angles to the drafting plane, which pressing button is connected with the catch by at least one intermediate member.

779,438 Loom Temples

"DRAHTEX" ING. GUSTAV HANKE G.M.B.H., *Kaldenkirchen — Leuth/Rheinland, Germany*.

Describes a twin-roller temple that can be readily adapted to suit different fabrics and loom constructions. The temple



comprises bracket carrying two elements 1 and 2 which are respectively in front of a front roller 3 and behind a rear roller 4, and a roller-form fabric-guiding element 5 between the rollers 3 and 4. The outer ends of the bar elements 1 and 2 are linked by a bridge piece 20 and at their ends are linked by a plate 6 which is adjustably mounted on a face 7 of the temple mounting bracket. The plate 6 is secured to the face 7 by bolts 8 which are in slots 9 so that the elements 1 and 2 are adjustable in unison towards and away from the rollers 3 and 4. The element 5 is adjustable on the face 7 by a bolt 10.

779,548 Measuring Material from Textile Machines

LINEN INDUSTRY RESEARCH ASSOCIATION, *Lambeg, Co. Antrim, N. Ireland*.

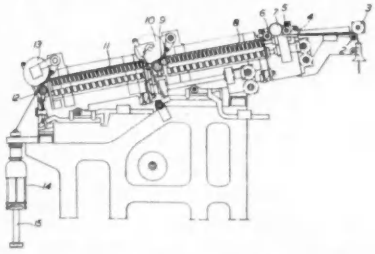
A method of measuring the amount of material delivered from a machine in which yarns, threads, cords, etc., is subjected to reeling, winding, etc. The length measuring device is driven at a speed proportional to the speed of delivery mechanism of the

machine and a detector device is operative to interrupt the drive to the measuring device when the material is not being delivered.

779,551 Duplex Gill Drawing Arrangement

J. G. CASANOVAS, 9 *Rue Duno Mongat, Barcelona, Spain.*

A spinning machine with a double drawing field, particularly adapted for use in the spinning of esparto grass. The double drawing unit forms part of a spinning machine provided with funnels serving as inlets for the slivers to be drawn and then twisted, and which are passed by feed rollers 2 and 3 and guides 4 to drawing rollers 5, 6 and 7 of the first unit, comprising gills which are caused to move by



screw-threaded spindles 8, the first draft being produced by the difference between the speeds of drawing roller 9 and roller 10, and the rate of feed of the gills. When the drawn slivers leave roller 9, they enter the second drawing field comprising gills which are moved by screw-threaded spindles 11, in which field the fibre is subjected to a second drawing under the action of a drawing roller 12 and a co-operating roller 13. The thread then passes through a flyer 14 of a spool 15.

779,649 Warp Dressing

GEBRUDER SUCKER G.M.B.H., 145 *Blumenbergerstrasse, Munchen-Gladbach, Rheinland, Germany.*

A method of continuously treating threads for weaving with a heat-liquifiable dressing medium, consists in first applying the medium to the surface of the threads, then pressing the dressing into the threads by passing them through a molten metal bath to a depth according to the required dressing effect, while maintaining the bath at a temperature not below that of the melting point of the medium. The treated threads are then cooled after they have passed out of the metal bath, and finally the dressed threads are wound or passed to warp beams.

779,674 Textile Rollers

J. THWAITES, 958 *Leeds Road, Dewsbury.*

A machine roller which is required to exercise a gripping effect on yarn or fabric comprises a metal spindle covered with a layer of plasticised polyvinyl chloride, a groove or grooves, either annular or helical being formed in the spindle, and the polyvinyl chloride coating material entering into the grooves. The spindle is placed in a hot mould and the polyvinyl chloride in paste form is injected into the mould. The complete roller is then removed from the mould and baked in an oven.

779,693 Self-Threading Loom Shuttles

E. HONEGGER, *Schaugen, near Hinwil, Zurich, Switzerland.*

Thread guide for shuttles in the body of which a channel open at the top and extending from the bearing of the bobbin to a thread exit opening is cut out. A body is pressed out of one piece of steel plate, with a U-shaped section serving for the passage of the thread, one side plate of which is bent at the top at right angles outwards and then continues as an arm bent downwards whilst the other side plate has a longitudinal extension the upper edge of which is bent inwards and covers the tip of an extension extending longitudinally of the first side plate. The arm of the first side plate is provided at its lower end with an eye for the direct outlet of the thread from the shuttle, which thread first passes through a slit eye which is cut in the first side plate in the direction of travel of the thread, and the tip of the projection of the first side plate enters an opening in the extension of the second side plate.

779,750 Testing Wear Properties of Fabrics

J. J. PRESS, 302-96*the Street, Brooklyn, Kings, New York, U.S.A.*

Apparatus for testing fabrics to determine their wearing qualities. The apparatus comprises a mount for the fabric, a mount for some friction material with transmission means for producing relative movement between the fabric and friction mounts. The fabric mount has a wall with a flat surface proportioned for backing engagement with the fabric, holding means coacting with this surface for maintaining the fabric in an unstrained condition. The friction mount has a wall with a flat surface in a plane parallel and in opposing relation to the plane of the flat surface of the fabric mount, one of the flat surfaces being of greater proportion than the other. The friction material is disposed evenly over the flat surface. One of the mounts is movable relative to the other mount along a path normal to the plane of the surfaces, the mounts in one of their relative positions being operatively engageable whereby the fabric will be in engagement with the friction material. The transmission means produces relative orbital movement between the mounts in the plane of engagement of fabric and friction material.

779,896 Double-Cylinder Jacquards

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779,905 Tinting Fibres Before Carding

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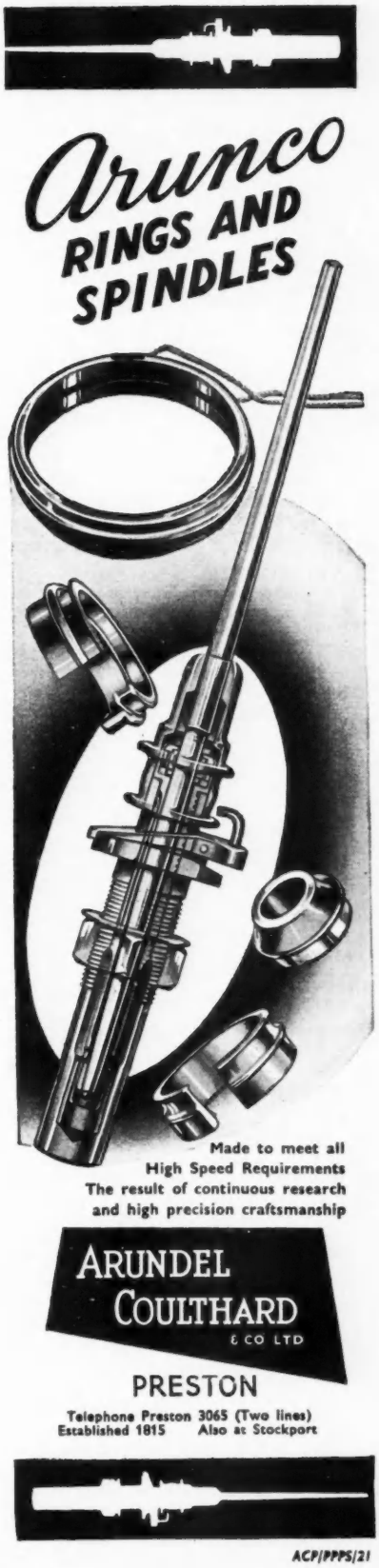
Apparatus for applying a liquid colouring medium to opened fibres in sheet form, comprises means for rolling a web of such fibres into a lap, including at least two spaced parallel rollers upon which the lap is supported. A transfer roller is arranged continuously to collect a supply of tinting liquid on its periphery and to rotate in frictional contact with one of the lap-supporting rollers, the colouring medium being thereby transferred to the lap.



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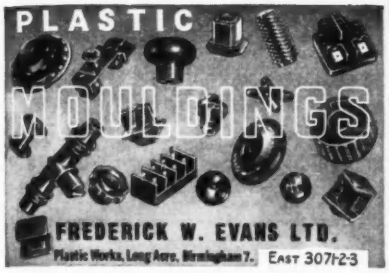

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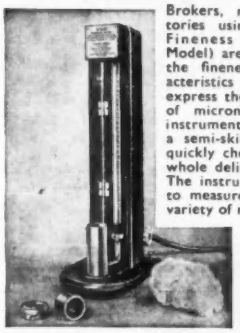

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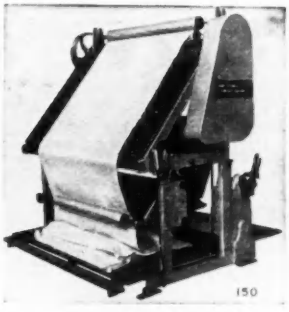

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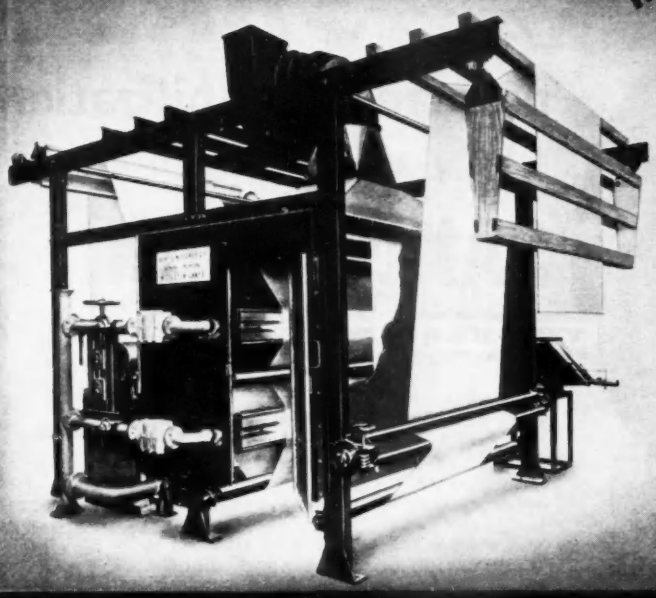

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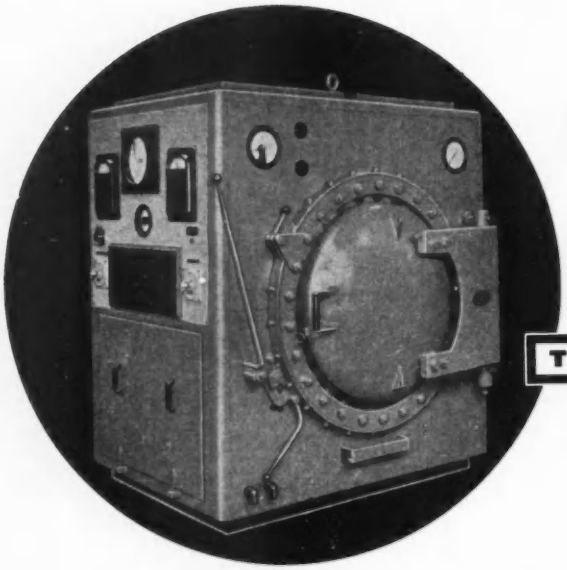

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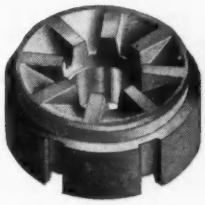

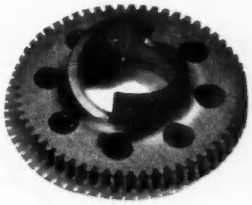

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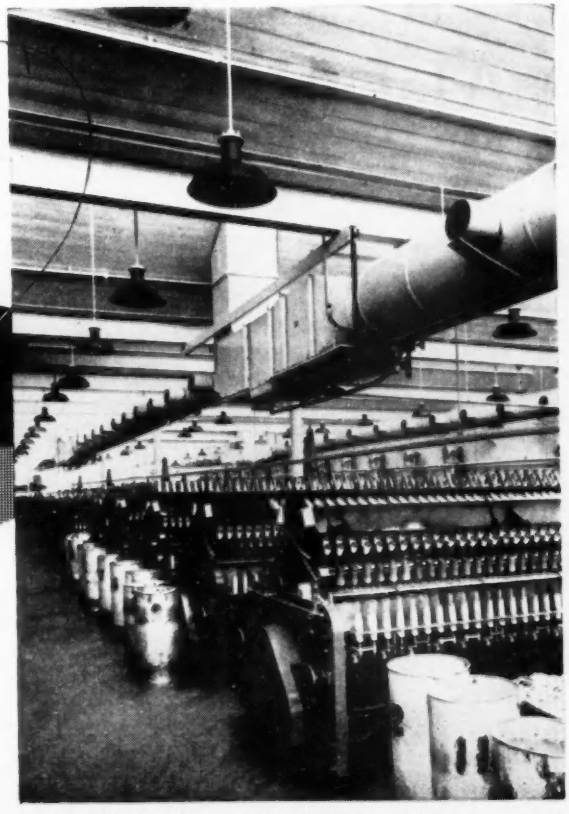

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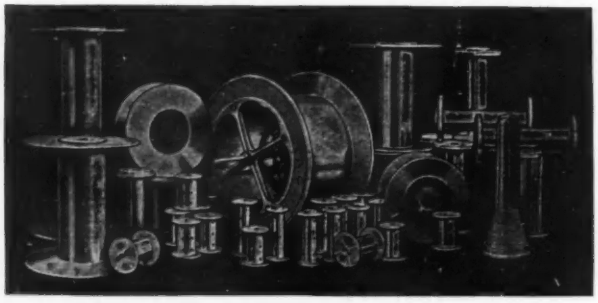

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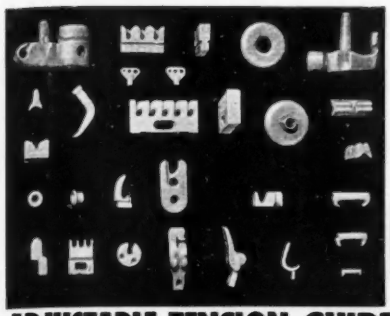

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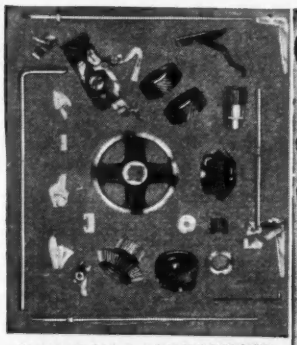

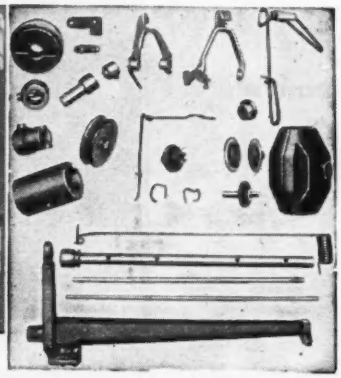

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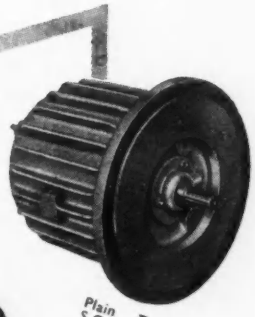

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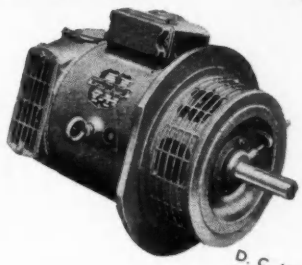
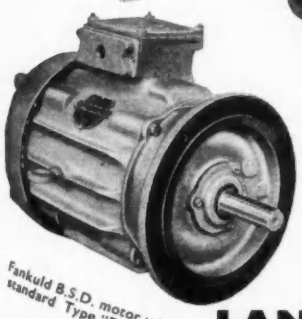


D. C. Motor for flange mounting fitted with adaptor ring to customer's specification.



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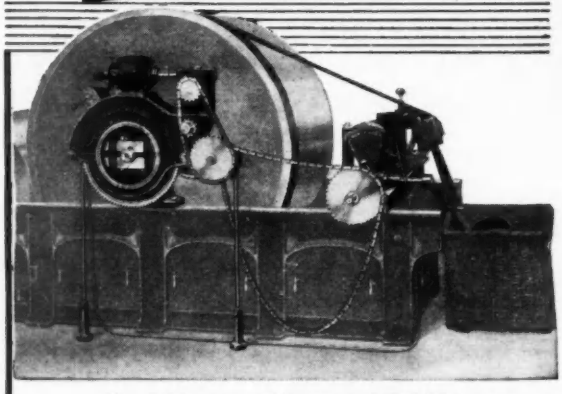

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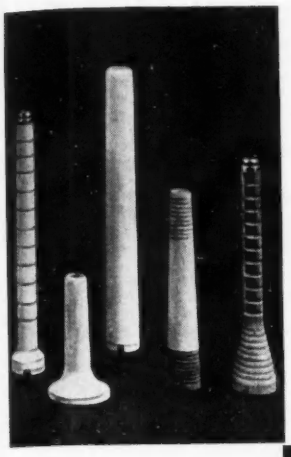

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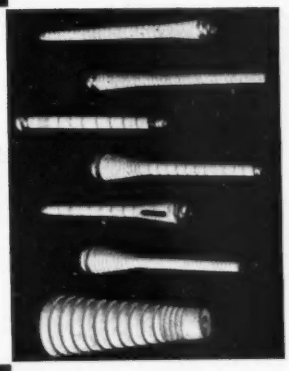

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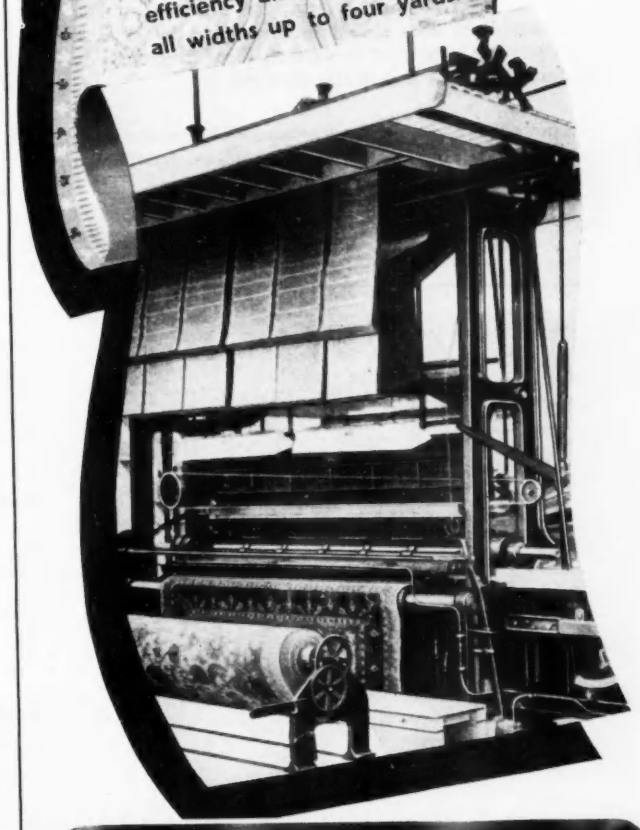

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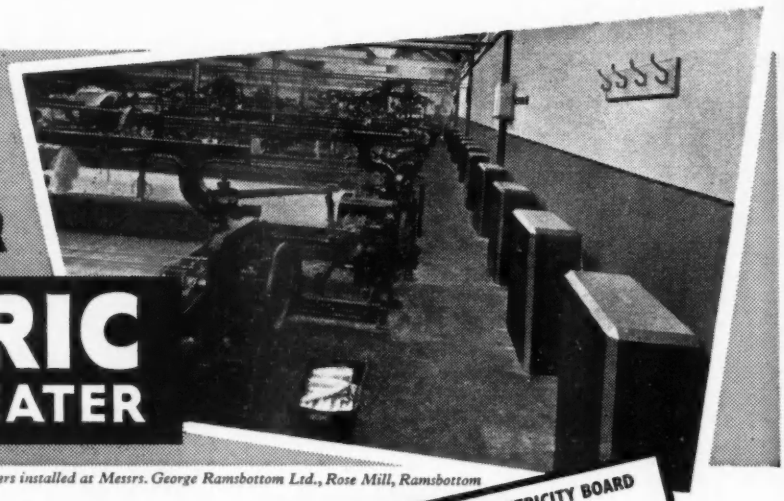

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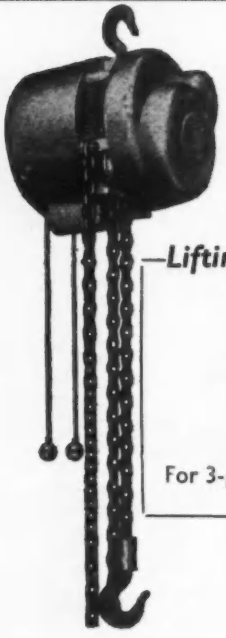

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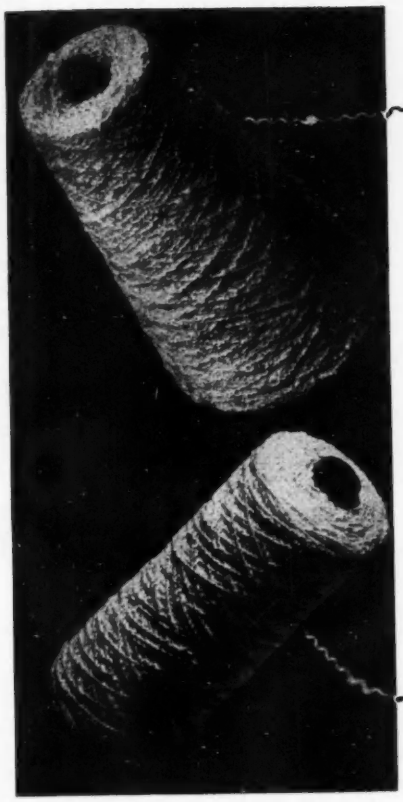

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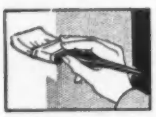

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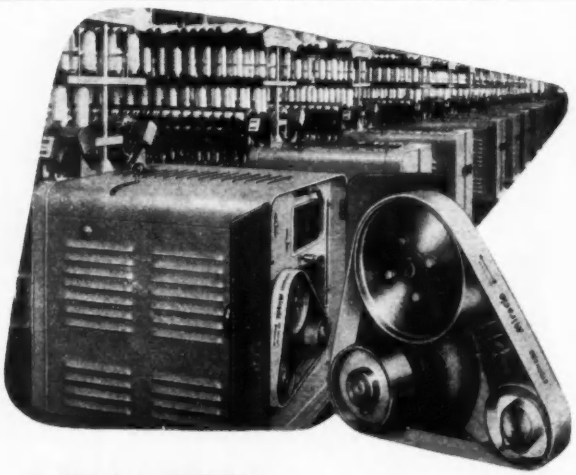

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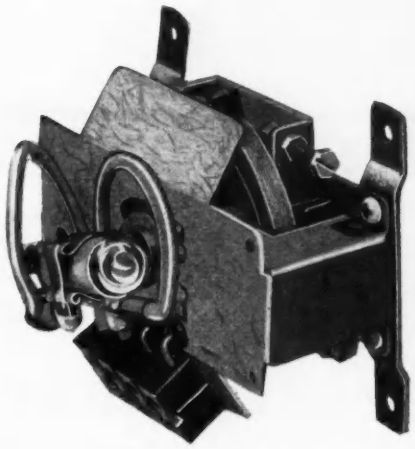

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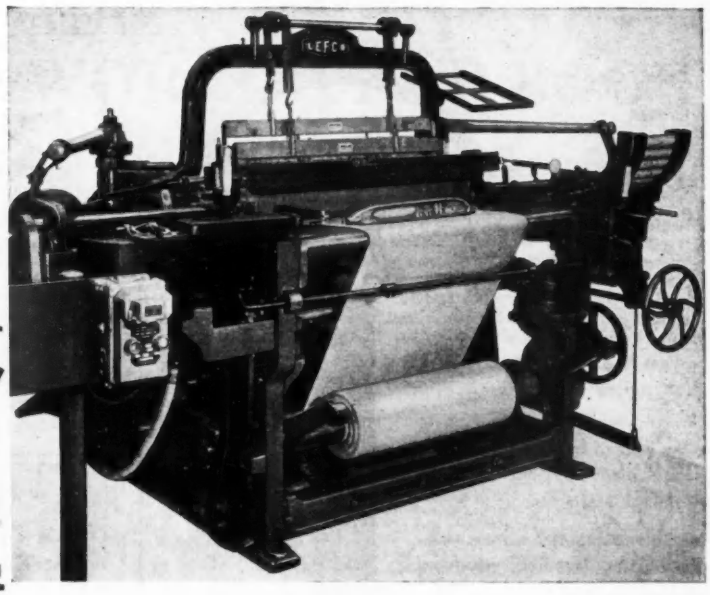

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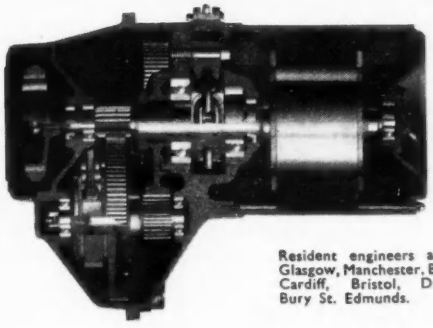

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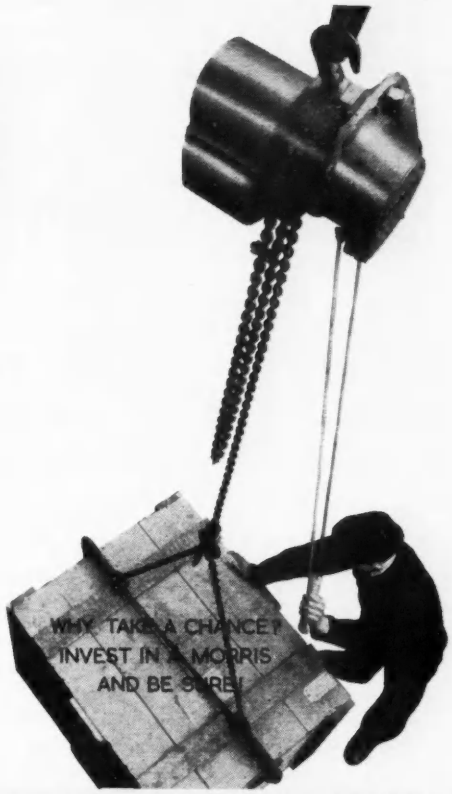

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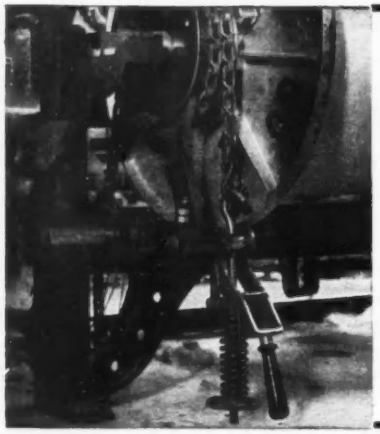

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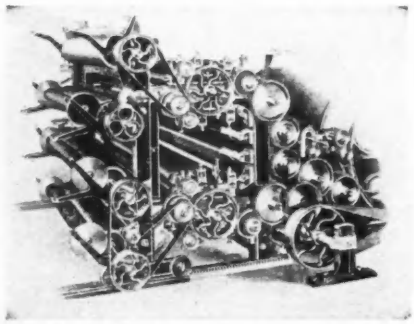

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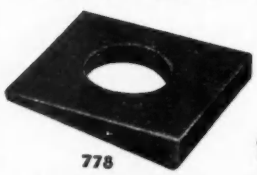

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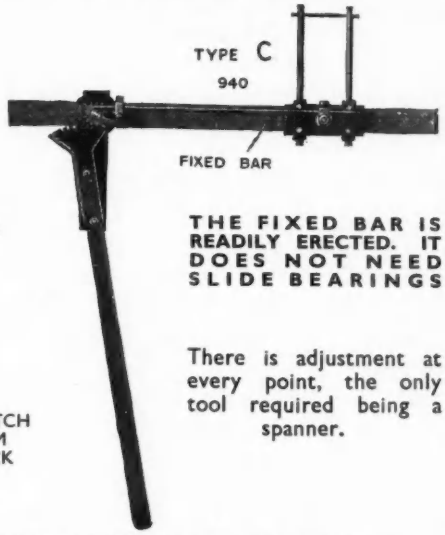

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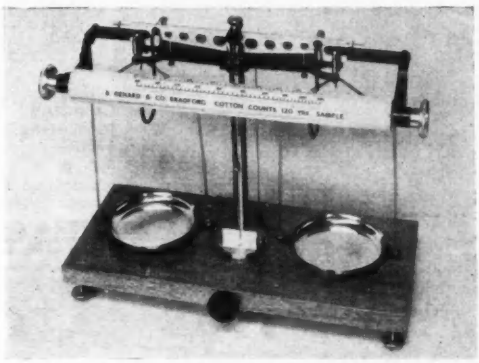

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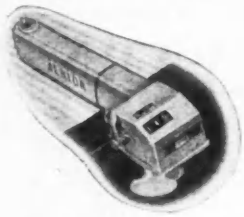

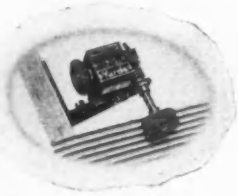

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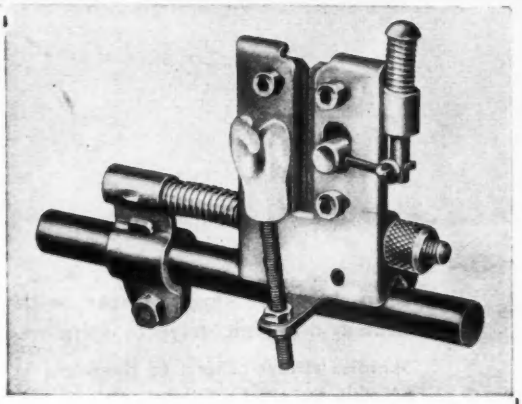

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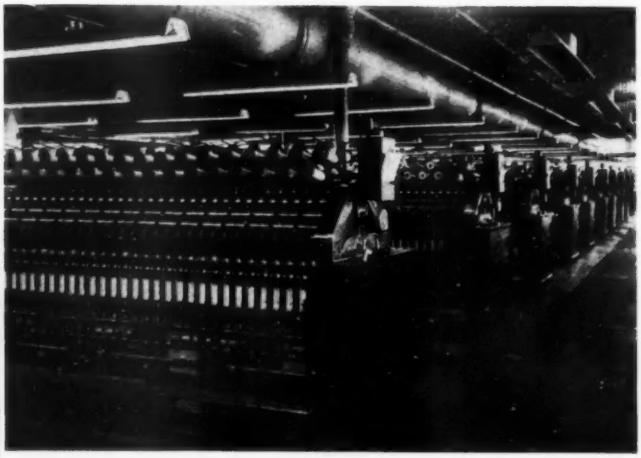

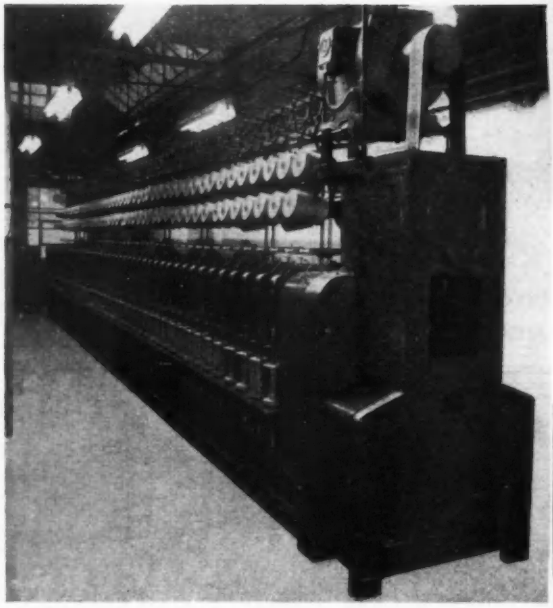

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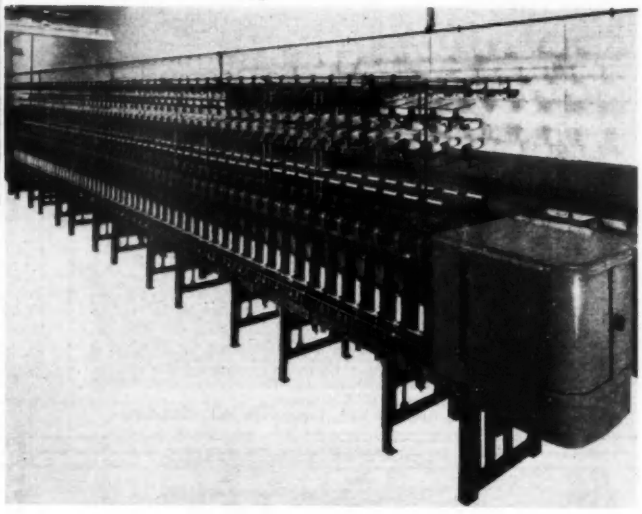

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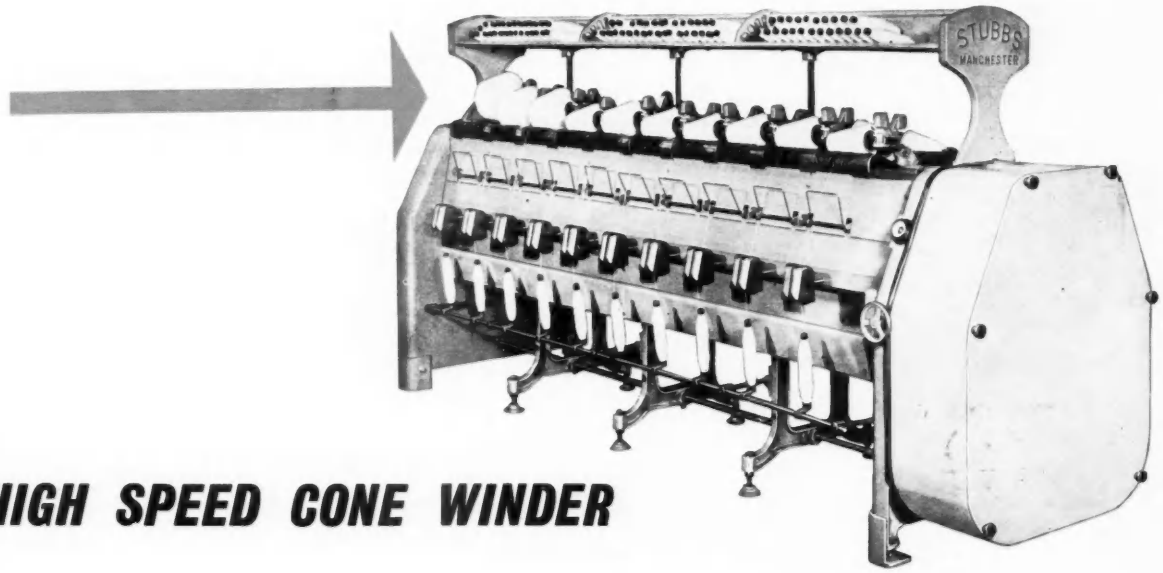

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